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LED LCD TV

SERVICE MANUAL

CHASSIS : LA21B

MODEL : 55LS5600 55LS5600-UC

CAUTION

BEFORE SERVICING THE CHASSIS,
READ THE SAFETY PRECAUTIONS IN THIS MANUAL.



P/NO : MFL67402828 (1202-REV00)

Printed in Korea

CONTENTS

CONTENTS	2
PRODUCT SAFETY	3
SPECIFICATION	4
ADJUSTMENT INSTRUCTION	9
TROUBLE SHOOTING	15
BLOCK DIAGRAM.....	23
EXPLODED VIEW	24
SCHEMATIC CIRCUIT DIAGRAM	

SAFETY PRECAUTIONS

IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by \triangle in the Schematic Diagram and Exploded View.

It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent Shock, Fire, or other Hazards.

Do not modify the original design without permission of manufacturer.

General Guidance

An **isolation Transformer should always be used** during the servicing of a receiver whose chassis is not isolated from the AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks.

It will also protect the receiver and its components from being damaged by accidental shorts of the circuitry that may be inadvertently introduced during the service operation.

If any fuse (or Fusible Resistor) in this TV receiver is blown, replace it with the specified.

When replacing a high wattage resistor (Oxide Metal Film Resistor, over 1 W), keep the resistor 10 mm away from PCB.

Keep wires away from high voltage or high temperature parts.

Before returning the receiver to the customer,

always perform an **AC leakage current check** on the exposed metallic parts of the cabinet, such as antennas, terminals, etc., to be sure the set is safe to operate without damage of electrical shock.

Leakage Current Cold Check(Antenna Cold Check)

With the instrument AC plug removed from AC source, connect an electrical jumper across the two AC plug prongs. Place the AC switch in the on position, connect one lead of ohm-meter to the AC plug prongs tied together and touch other ohm-meter lead in turn to each exposed metallic parts such as antenna terminals, phone jacks, etc.

If the exposed metallic part has a return path to the chassis, the measured resistance should be between 1 M Ω and 5.2 M Ω .

When the exposed metal has no return path to the chassis the reading must be infinite.

An other abnormality exists that must be corrected before the receiver is returned to the customer.

Leakage Current Hot Check (See below Figure)

Plug the AC cord directly into the AC outlet.

Do not use a line Isolation Transformer during this check.

Connect 1.5 K / 10 watt resistor in parallel with a 0.15 μ F capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.

Measure the AC voltage across the resistor using AC voltmeter with 1000 ohms/volt or more sensitivity.

Reverse plug the AC cord into the AC outlet and repeat AC voltage measurements for each exposed metallic part. Any voltage measured must not exceed 0.75 volt RMS which corresponds to 0.5 mA.

In case any measurement is out of the limits specified, there is possibility of shock hazard and the set must be checked and repaired before it is returned to the customer.

Leakage Current Hot Check circuit



When 25A is impressed between Earth and 2nd Ground for 1 second, Resistance must be less than 0.1 Ω

*Base on Adjustment standard

SPECIFICATION

NOTE : Specifications and others are subject to change without notice for improvement.

1. Application range

This spec sheet is applied LCD TV with LA21B/C chassis

2. Test condition

Each part is tested as below without special notice.

- 1) Temperature : 25 °C ± 5 °C (77 °F ± 9 °F), CST : 40 °C±5 °C
- 2) Relative Humidity: 65 % ± 10 %
- 3) Power Voltage
: Standard input voltage (AC 110-240 V~, 50/60 Hz)
* Standard Voltage of each products is marked by models.
- 4) Specification and performance of each parts are followed each drawing and specification by part number in accordance with BOM.
- 5) The receiver must be operated for about 5 minutes prior to the adjustment.

3. Test method

- 1) Performance: LGE TV test method followed
- 2) Demanded other specification
 - Safety : UL, CSA, IEC specification
 - EMC: FCC, ICES, IEC specification

4. General Specification

No	Item		Specification		Remark
1	Receiving System		1) ATSC / NTSC-M		
2	Available Channel		1) VHF : 02~13		
			2) UHF : 14~69		
			3) DTV : 02-69		
			4) CATV : 01~135		
			5) CADTV : 01~135		
3	Input Voltage		1) AC 100 ~ 240V 50/60Hz		Mark : 110V, 60Hz (N.America)
4	Market		NORTH AMERICA		
5	Screen Size		47/55 inch Wide (1920 × 1080)	FHD + 60Hz	
6	Aspect Ratio		16:9		
7	Tuning System		FS		
8	Module	Edge LED	LC550EUE-SEM1 (T120)	LGD	47LS4600-UA
			LC470EUE-SEM1 (T120)	LGD	55LS4600-UA
9	Operating Environment		1) Temp : 0 ~ 40 deg 2) Humidity : ~ 80 %		
10	Storage Environment		1) Temp : -20 ~ 60 deg 2) Humidity : ~ 85 %		

5. Component Video Input (Y, C_B/P_B, C_R/P_R)

No	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed
1	720*480	15.73	60.00	13.5135	SDTV ,DVD 480I
2	720*480	15.73	59.94	13.50	SDTV ,DVD 480I
3	720*480	31.50	60.00	27.027	SDTV 480P
4	720*480	31.47	59.94	27.00	SDTV 480P
5	1280*720	45.00	60.00	74.25	HDTV 720P
6	1280*720	44.96	59.94	74.176	HDTV 720P
7	1920*1080	33.75	60.00	74.25	HDTV 1080I
8	1920*1080	33.72	59.94	74.176	HDTV 1080I
9	1920*1080	67.50	60.00	148.50	HDTV 1080P
10	1920*1080	67.432	59.94	148.352	HDTV 1080P
11	1920*1080	27.00	24.00	74.25	HDTV 1080P
12	1920*1080	26.97	23.94	74.176	HDTV 1080P
13	1920*1080	33.75	30.00	74.25	HDTV 1080P
14	1920*1080	33.71	29.97	74.176	HDTV 1080P

6. RGB (PC)

No	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed	DDC	Remark
1	640*350	31.468	70.09	25.17	EGA	X	
2	720*400	31.469	70.08	28.32	DOS	O	
3	640*480	31.469	59.94	25.17	VESA(VGA)	O	
4	800*600	37.879	60.31	40.00	VESA(SVGA)	O	
5	1024*768	48.363	60.00	65.00	VESA(XGA)	O	
6	1152*864	54.348	60.053		VESA	O	
7	1360*768	47.712	60.015	85.50	VESA (WXGA)	O	
8	1920*1080	66.587	59.934	138.5	WUXGA	O	Full HD model Only

7. HDMI Input

No.	Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock(MHz)	Proposed		Remarks
	PC (DVI)				DDC		
1	640*350	31.468	70.09	25.17	EGA	X	
2	720*400	31.469	70.08	28.32	DOS	O	
3	640*480	31.469	59.94	25.17	VESA(VGA)	O	
4	800*600	37.879	60.31	40.00	VESA(SVGA)	O	
5	1024*768	48.363	60.00	65.00	VESA(XGA)	O	
6	1152*864	54.348	60.053		VESA	O	
7	1280*1024	63.981	60.020	108.0	VESA (SXGA)	O	Full HD model Only
8	1360*768	47.712	60.015	85.50	VESA (WXGA)	O	
9	1920*1080	67.50	60.00	148.5	HDTV 1080P	O	Full HD model Only
	DTV						
1	720*480	31.47	60.00	27.027	SDTV 480P		
2	720*480	31.47	59.94	27.00	SDTV 480P		
3	1280*720	45.00	60.00	74.25	HDTV 720P		
4	1280*720	44.96	59.94	74.176	HDTV 720P		
5	1920*1080	33.75	60.00	74.25	HDTV 1080I		
6	1920*1080	33.72	59.94	74.176	HDTV 1080I		
7	1920*1080	67.50	60.00	148.50	HDTV 1080P		
8	1920*1080	67.432	59.94	148.352	HDTV 1080P		
9	1920*1080	27.00	24.00	74.25	HDTV 1080P		
10	1920*1080	26.97	23.976	74.176	HDTV 1080P		
11	1920*1080	33.75	30.00	74.25	HDTV 1080P		
12	1920*1080	33.71	29.97	74.176	HDTV 1080P		

8. 3D Mode (LM5800//LM4600/ CM565 models)

8.1. RF 3D Input(DTV)

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed	3D input proposed mode
1	1280*720	37.5	50	74.25	HDTV 720P	Side by Side, Top & Bottom
2	1920*1080	28.125	50	74.25	HDTV 1080I	Side by Side, Top & Bottom

8.2. HDMI Input (V1.4a)

- When connect the cable on TV or change the input mode, 3D display on automatically
- Display OSD information -> 1920x2205 [1080p 24], 1280x1470 [720p 60]

No.	Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock(MHz)	Proposed	3D input proposed mode
1	1280*720	89.9 / 90	59.94/60	148.35/148.5	HDTV 720P	Frame packing (720 60p)
2	1280*720	45	60	74.25	HDTV 720P	Side by Side(half), Top & Bottom
3	1920*1080	53.95 / 54	23.98 / 24	148.35/148.5	HDTV 1080P	Frame packing (1080 24p)
4	1920*1080	67.5	60	148.5	HDTV 1080P	Side by Side(half), Top & bottom
5	1920*1080	33.7	60	74.25	HDTV 1080i	Side by Side(half), Top & Bottom
6	1920*1080	27	24	74.25	HDTV 1080P	Side by Side(half), Top & Bottom
7	1920*1080	33.7	30	74.25	HDTV 1080P	Side by Side(half), Top &Bottom

8.3. HDMI Input(1.3)

- Connect the HDMI cable & receiving the HDMI signal
- Press "3D" key of remote control & select 3D format below.

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed	3D input proposed mode
1	1280*720	45.00	60.00	74.25	HDTV 720P	Side by Side, Top & Bottom
2	1920*1080	33.75	60.00	74.25	HDTV 1080I	Side by Side, Top & Bottom
3	1920*1080	27.00	24.00	74.25	HDTV 1080P	Side by Side, Top & Bottom
4	1920*1080	33.75	30.00	74.25	HDTV 1080P	Side by Side, Top & Bottom
5	1920*1080	67.50	60.00	148.5	HDTV 1080P	Side by Side, Top & Bottom, Single Frame Sequential

8.4. USB Input

(1) Movie

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	3D input proposed mode	Proposed
1	1920*1080	33.75	30	74.25	Side by Side	HDTV 1080P
					Top & Bottom	

(2) MPO Picture 3D : when selecting the MPO file, Automatically 3D on





(3) 3D Demo in store mode

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed	3D input proposed mode
1	1920*1080	33.75	30.00	74.25	HDTV 1080P	Side by Side

8.5. RGB-PC Input

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed	3D input proposed mode
1	1920*1080	66.587	59.93	138.625	HDTV 1080P	Side by Side, Top & Bottom

8.6. 3D Input mode

No.	Side by Side	Top & Bottom	Single Frame Sequential	Frame Packing		
1						

8.7. DLNA

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed	Remark
1	1920*1080	33.75	30	74.25	HDTV 1080P	Side by Side, Top & Bottom

ADJUSTMENT INSTRUCTION

1. Application Range

This spec. sheet applies to LA21B/C Chassis applied LCD TV all models manufactured in TV factory.

2. Specification

- (1) Because this is not a hot chassis, it is not necessary to use an isolation transformer. However, the use of isolation transformer will help protect test instrument.
- (2) Adjustment must be done in the correct order.
- (3) The adjustment must be performed in the circumstance of 25 ± 5 °C of temperature and $65 \pm 10\%$ of relative humidity if there is no specific designation.
- (4) The input voltage of the receiver must keep 100~240V, 50/60Hz.
- (5) At first Worker must turn on the SET by using Power Only key.
- (6) The receiver must be operated for about 5 minutes prior to the adjustment when module is in the circumstance of over 15 °C
In case of keeping module is in the circumstance of 0°C, it should be placed in the circumstance of above 15°C for 2 hours
In case of keeping module is in the circumstance of below -20°C, it should be placed in the circumstance of above 15°C for 3 hours.

[Caution]

When still image is displayed for a period of 20 minutes or longer (especially where W/B scale is strong. Digital pattern 13ch and/or Cross hatch pattern 09ch), there can some afterimage in the black level area

3. Adjustment items

3.1. Main PCBA Adjustments

- (1) ADC adjustment: Component 480i, 1080p / RGB-PC 1080p
 - (2) EDID download: HDMI and RGB-PC
- Above adjustment items can be also performed in Final Assembly if needed. Both Board-level and Final assembly adjustment items can be check using In-Start Menu (1. Adjust Check). Component 1080p and RGB-PC Adjust will be calculated by 480i adjust value.

3.2. Final assembly adjustment

- (1) White Balance adjustment
- (2) RS-232C functionality check
- (3) Factory Option setting per destination
- (4) Shipment mode setting (In-Stop)
- (5) GND and HI-POT test

3.3. Appendix

- (1) Shipment conditions
- (2) Tool option menu
- (3) USB Download (S/W Update, Option and Service only)
- (4) Preset CH Information

4. MAIN PCBA Adjustments

4.1. ADC Adjustment

4.1.1. Overview

- ADC adjustment is needed to find the optimum black level and gain in Analog-to-Digital device and to compensate RGB deviation.

4.1.2. Equipment & Condition

- (1) Protocol: RS-232C
- (2) Inner Pattern
 - Resolution : 1080p(Comp) / 1024*768(RGB)
 - Pattern : Horizontal 100% Color Bar Pattern
 - Pattern level : 0.7 ± 0.1 Vp-p

4.1.3. Adjustment

4.1.3.1. Adjustment method

- Connect to Jig by using RS-232, adjust Component and RGB
- Manual adj (If needed in Final Assembly)
 - Required equipment : Adjustment R/C
 - Enter Service Mode by pushing "ADJ" key,
 - Enter Internal ADC mode by pushing '►' key at [6. ADC Calibration]

4.1.3.2. Adj. protocol

- Connect to Jig by using RS-232, adjust Component and RGB

Protocol	CMD 1	CMD 2	Data 1	Data 2	Remark
Enter adj mode	a	a	00	00	When transfer the 'Mode In', Carry the command.
Start ADC adj	a	d	00	10	Automatically adjustment (Use internal pattern)

4.2. EDID Download

4.2.1. Overview

- It is a VESA regulation. A PC or a MNT will display an optimal resolution through information sharing without any necessity of user input. It is a realization of "Plug and Play".

4.2.2. Equipment

- (1) Since EDID data is embedded, EDID download JIG, HDMI cable and D-sub cable are not need.
- (2) Adjust by using remote controller.

4.2.3. Download method

- (1) Press Adj. key on the Adj. R/C.
 - (2) Select EDID D/L menu.
 - (3) By pressing Enter key, EDID download will begin
 - (4) If Download is successful, OK is display, but If Download is failure, NG is displayed.
 - (5) If Download is failure, Re-try downloads.
- [Caution] : When EDID Download, must remove RGB/HDMI Cable.

4.2.4. EDID DATA

4.2.4.1. North America (PCM)

- (1) FHD Model - 8Bit

■ HDMI 1-FHD-8BIT (C/S : E9CF)
EDID Block 0, Bytes 0-127 [00H-7FH]

0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0		00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01
10		01	16	01	03	80	A0	5A	78	0A	EE	91	A3	54	4C
20		0F	50	54	A1	08	00	31	40	45	40	61	40	71	40
30		01	01	01	01	01	01	02	3A	80	18	71	38	2D	40
40		45	00	40	84	63	00	00	1E	66	21	50	B0	51	00
50		40	70	36	00	40	84	63	00	00	1E	00	00	00	FD
60		3E	1E	53	10	00	0A	20	20	20	20	20	20	00	00
70		00	4C	47	20	54	56	0A	20	20	20	20	20	01	E9

EDID Block 1, Bytes 128-255 [80H-FFH]

0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0		02	03	19	F1	48	90	22	20	05	04	03	02	01	23
10		07	67	03	0C	00	10	00	80	1E	02	3A	80	18	71
20		40	58	2C	04	05	40	84	63	00	00	1E	01	1D	80
30		1C	16	20	58	2C	25	00	40	84	63	00	00	9E	01
40		72	51	D0	1E	20	6E	28	55	00	40	84	63	00	00
50		0A	D0	8A	20	E0	2D	10	10	3E	96	00	40	84	63
60		18	26	36	80	A0	70	38	1F	40	30	20	25	00	40
70		00	00	1A	00	00	00	00	00	00	00	00	00	00	CF

■ HDMI 2-FHD-8BIT (C/S : E9BF)
EDID Block 0, Bytes 0-127 [00H-7FH]

0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0		00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01
10		01	16	01	03	80	A0	5A	78	0A	EE	91	A3	54	4C
20		0F	50	54	A1	08	00	31	40	45	40	61	40	71	40
30		01	01	01	01	01	01	02	3A	80	18	71	38	2D	40
40		45	00	40	84	63	00	00	1E	66	21	50	B0	51	00
50		40	70	36	00	40	84	63	00	00	1E	00	00	00	FD
60		3E	1E	53	10	00	0A	20	20	20	20	20	20	00	00
70		00	4C	47	20	54	56	0A	20	20	20	20	20	01	E9

EDID Block 1, Bytes 128-255 [80H-FFH]

0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0		02	03	19	F1	48	90	22	20	05	04	03	02	01	23
10		07	67	03	0C	00	20	00	80	1E	02	3A	80	18	71
20		40	58	2C	04	05	40	84	63	00	00	1E	01	1D	80
30		1C	16	20	58	2C	25	00	40	84	63	00	00	9E	01
40		72	51	D0	1E	20	6E	28	55	00	40	84	63	00	00
50		0A	D0	8A	20	E0	2D	10	10	3E	96	00	40	84	63
60		18	26	36	80	A0	70	38	1F	40	30	20	25	00	40
70		00	00	1A	00	00	00	00	00	00	00	00	00	00	BF

■ HDMI 3-FHD-8BIT (C/S : E9AF)
EDID Block 0, Bytes 0-127 [00H-7FH]

0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0		00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01
10		01	16	01	03	80	A0	5A	78	0A	EE	91	A3	54	4C
20		0F	50	54	A1	08	00	31	40	45	40	61	40	71	40
30		01	01	01	01	01	01	02	3A	80	18	71	38	2D	40
40		45	00	40	84	63	00	00	1E	66	21	50	B0	51	00
50		40	70	36	00	40	84	63	00	00	1E	00	00	00	FD
60		3E	1E	53	10	00	0A	20	20	20	20	20	20	00	00
70		00	4C	47	20	54	56	0A	20	20	20	20	20	01	E9

EDID Block 1, Bytes 128-255 [80H-FFH]

0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0		02	03	19	F1	48	90	22	20	05	04	03	02	01	23
10		07	67	03	0C	00	30	00	80	1E	02	3A	80	18	71
20		40	58	2C	04	05	40	84	63	00	00	1E	01	1D	80
30		1C	16	20	58	2C	25	00	40	84	63	00	00	9E	01
40		72	51	D0	1E	20	6E	28	55	00	40	84	63	00	00
50		0A	D0	8A	20	E0	2D	10	10	3E	96	00	40	84	63
60		18	26	36	80	A0	70	38	1F	40	30	20	25	00	40
70		00	00	1A	00	00	00	00	00	00	00	00	00	00	AF

■ RGB-FHD (C/S : 02)
EDID Block 0, Bytes 0-127 [00H-7FH]

0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0		00	FF	FF	FF	FF	FF	FF	00	1E	6D	01	00	01	01
10		01	16	01	03	80	A0	5A	78	0A	EE	91	A3	54	4C
20		0F	50	54	A1	08	00	31	40	45	40	61	40	71	40
30		01	01	01	01	01	01	02	3A	80	18	71	38	2D	40
40		45	00	40	84	63	00	00	1E	66	21	50	B0	51	00
50		40	70	36	00	40	84	63	00	00	1E	00	00	00	FD
60		3E	1E	53	10	00	0A	20	20	20	20	20	20	00	00
70		00	4C	47	20	54	56	0A	20	20	20	20	20	00	02

5. Final Assembly Adjustment

5.1. White Balance Adjustment

5.1.1. Overview

5.1.1.1. W/B adj. Objective & How-it-works

- (1) Objective: To reduce each Panel's W/B deviation
- (2) How-it-works: When R/G/B gain in the OSD is at 192, it means the panel is at its Full Dynamic Range. In order to prevent saturation of Full Dynamic range and data, one of R/G/B is fixed at 192, and the other two is lowered to find the desired value.
- (3) Adj. condition: normal temperature
 - Surrounding Temperature: 25±5 °C
 - Warm-up time: About 5 Min
 - Surrounding Humidity: 20% ~ 80%
 - Before White balance adjustment, Keep power on status, don't power off

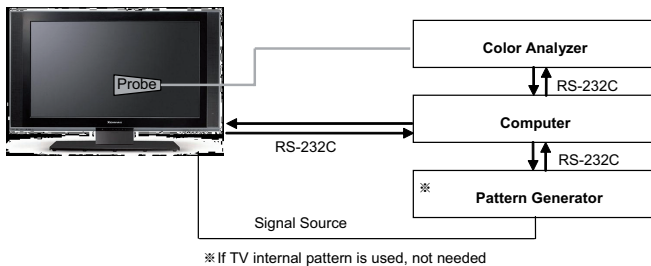
5.1.1.2. Adj. condition and cautionary items

- (1) Lighting condition in surrounding area surrounding lighting should be lower 10 lux. Try to isolate adj. area into dark surrounding.
- (2) Probe location: Color Analyzer (CA-210) probe should be within 10cm and perpendicular of the module surface (80°~ 100°)
- (3) Aging time
 - After Aging Start, Keep the Power ON status during 5 Minutes.
 - In case of LCD, Back-light on should be checked using no signal or Full-white pattern.

5.1.2. Equipment

- (1) Color Analyzer: CA-210 (NCG: CH 9 / WCG: CH12 / LED: CH14)
- (2) Adj. Computer(During auto adj., RS-232C protocol is needed)
- (3) Adjust Remocon
- (4) Video Signal Generator MSPG-925F 720p/204-Gray (Model:217, Pattern:49)
 - Only when internal pattern is not available
 - ※ Color Analyzer Matrix should be calibrated using CS-1000

5.1.3. Equipment connection



5.1.4. Adjustment Command (Protocol)

(1) RS-232C Command used during auto-adj

RS-232C COMMAND			Explanation
CMD	DATA	ID	
Wb	00	00	Begin White Balance adj.
Wb	00	ff	End White Balance adj. (internal pattern disappears)

(2) Adjustment Map

	Adj. item	Command (lower case ASCII)		Data Range (Hex.)	Default (Decimal)
		CMD1	CMD2	MIN	MAX
Cool	R Gain	j	g	00	C0
	G Gain	j	h	00	C0
	B Gain	j	i	00	C0
	R Cut				
	G Cut				
	B Cut				
Medium	R Gain	j	a	00	C0
	G Gain	j	b	00	C0
	B Gain	j	c	00	C0
	R Cut				
	G Cut				
	B Cut				
Warm	R Gain	j	d	00	C0
	G Gain	j	e	00	C0
	B Gain	j	f	00	C0
	R Cut				
	G Cut				

5.1.5. Adjustment method

5.1.5.1. Auto WB calibration

- (1) Set TV in ADJ mode using P-ONLY key (or POWER ON key)
 - (2) Place optical probe on the center of the display
- It need to check probe condition of zero calibration before adjustment.
 - (3) Connect RS-232C Cable
 - (4) Select mode in ADJ Program and begin a adjustment.
 - (5) When WB adjustment is completed with OK message, check adjustment status of pre-set mode (Cool, Medium, Warm)
 - (6) Remove probe and RS-232C cable.
- ※ W/B Adj. must begin as start command "wb 00 00" , and finish as end command "wb 00 ff", and Adj. offset if need.

5.1.5.2. Manual adj. method

- (1) Set TV in Adj. mode using POWER ON
- (2) Zero Calibrate the probe of Color Analyzer, then place it on the center of LCD module within 10cm of the surface..
- (3) Press ADJ key -> EZ adjust using adj. R/C -> 6. White-Balance then press the cursor to the right (KEY▶).
(When KEY(▶) is pressed 204 Gray(80IRE) internal pattern will be displayed)
- (4) One of R Gain / G Gain / B Gain should be fixed at 192, and the rest will be lowered to meet the desired value.
- (5) Adj. is performed in COOL, MEDIUM, WARM 3 modes of color temperature.

5.1.6. Reference (White Balance Adj. coordinate and color temperature)

- Luminance: 204 Gray, 80IRE
- ** Lamp Module
- Standard color coordinate and temperature using CS-1000 (over 26 inch)

Mode	Coordinate		Temp	△uv
	X	Y		
Cool	0.269	0.273	13,000K	0.0000
Medium	0.285	0.293	9,300K	0.0000
Warm	0.313	0.329	6,500K	0.0000

- Standard color coordinate and temperature using CA-210(CH 14)

Mode	Coordinate		Temp	△uv
	X	Y		
Cool	0.269±0.002	0.273±0.002	13,000K	0.0000
Medium	0.285±0.002	0.293±0.002	9,300K	0.0000
Warm	0.313±0.002	0.329±0.002	6,500K	0.0000

** Only Edge-LED OS(AUO,CMI,IPS,Sharp) Module except AUO 65"

- Standard color coordinate and temperature using CS-1000 (over 26 inch)

Mode	Coordinate		Temp	△uv
	X	Y		
Cool	0.271	0.276	13,000K	0.0000
Medium	0.287	0.296	9,300K	0.0000
Warm	0.315	0.332	6,500K	0.0000

- Standard color coordinate and temperature using CA-210(CH 14)

Mode	Coordinate		Temp	△uv
	X	Y		
Cool	0.271±0.002	0.276±0.002	13,000K	0.0000
Medium	0.287±0.002	0.296±0.002	9,300K	0.0000
Warm	0.315±0.002	0.332±0.002	6,500K	0.0000

** Only Edge-LED LGD Module

- Standard color coordinate and temperature using CA-210(CH-14) – by aging time

GP3	Aging time (Min)	Cool		Medium		Warm	
		X	Y	X	Y	X	Y
		269	273	285	293	313	329
1	0-2	280	287	296	307	320	337
2	3-5	279	286	295	305	319	335
3	6-9	277	284	292	304	317	334
4	10-19	276	283	292	303	316	333
5	20-35	274	280	290	300	314	330
6	36-49	272	277	288	297	312	327
7	50-79	271	275	287	295	311	325
8	80-149	270	274	286	294	310	324
9	Over 150	269	273	285	293	309	323

5.2. Option selection per country

5.2.1. Overview

- (1) Tool option selection is only done for models in Non-USA North America due to rating
- (2) Applied model: LA02D and LA02E Chassis applied to CANADA and MEXICO

5.2.2. Country Group selection

- (1) Press ADJ key on the Adj. R/C, and then select Country Group Menu
- (2) Depending on destination, select KR or US, then on the lower Country option, select US, CA, MX.
Selection is done using +, - KEY

5.2.3. Tool Option inspection

- Press Adj. key on the Adj. R/C, then select Tool option.

Model	Module	Tool 1	Tool 2	Tool 3	Tool 4	Tool 5
47LM4600-UA	LGD	32855	2423	10523	29612	7170
55LM4600-UA	LGD	32857	2423	11547	29612	7170
32LS5600-UA	LGD	16725	2423	10523	29612	7202
37LS5600-UC	LGD	16725	2423	9499	29612	7202
47LS5600-UC	AUO	20823	2423	9499	29612	7218
55LS5600-UC	LGD	20825	2423	9499	29612	7170
55LS5600-UC	AUO	20825	2423	9499	29612	7218

6. GND and HI-POT Test

6.1. GND & HI-POT auto-check preparation

- (1) Check the POWER CABLE and SIGNAL CABLE insertion condition

6.2. GND & HI-POT auto-check

- (1) Pallet moves in the station. (POWER CORD / AV CORD is tightly inserted)
- (2) Connect the AV JACK Tester.
- (3) Controller (GWS103-4) on.
- (4) GND Test (Auto)
 - If Test is failed, Buzzer operates.
 - If Test is passed, execute next process (Hi-pot test).
(Remove A/V CORD from A/V JACK BOX)
- (5) HI-POT test (Auto)
 - If Test is failed, Buzzer operates.
 - If Test is passed, GOOD Lamp on and move to next process automatically.

6.3. Checkpoint

- (1) Test voltage
 - GND: 1.5KV/min at 100mA
 - SIGNAL: 3KV/min at 100mA
- (2) TEST time: 1 second
- (3) TEST POINT
 - GND Test = POWER CORD GND and SIGNAL CABLE GND.
 - Hi-pot Test = POWER CORD GND and LIVE & NEUTRAL.
- (4) LEAKAGE CURRENT: At 0.5mArms

7. AUDIO output check

7.1. Audio input condition

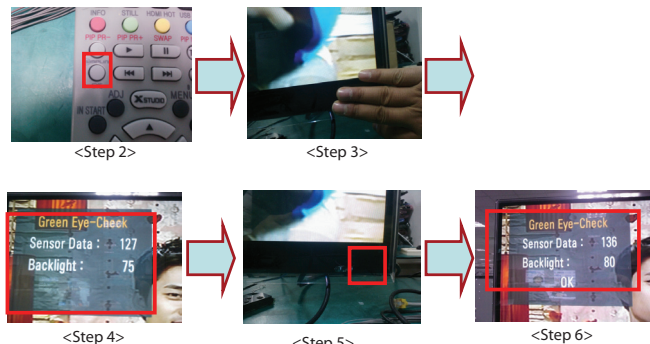
- (1) RF input: Mono, 1KHz sine wave signal, 100% Modulation
- (2) CVBS, Component: 1KHz sine wave signal (0.4Vrms)
- (3) RGB PC: 1KHz sine wave signal (0.7Vrms)

7.2. Specification

No	Item	Min	Typ	Max	Unit	Remark
1	Audio practical max Output, L/R	9.0 8.5	10.0 8.9	12.0 9.9	W Vrms	(1) Measurement condition - EQ/AVL/Clear Voice: Off (2) Speaker (8Ω Impedance)

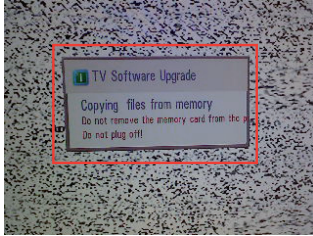
8. EYE-Q Check

- Step 1) Turn on the TV..
- Step 2) Press 'EYE' button' on the adjustment remote-controller.
- Step 3) Cover 'Eye Q sensor' on the front of set with your hands, hold it for 6 seconds.
- Step 4) Check "the Sensor Data" on the screen, make certain that Data is below 10. If Data isn't below 10 in 6 seconds, Eye Q sensor would be bad. You should change Eye Q sensor.
- Step 5) Uncover your hands from Eye Q sensor, hold it for 6 seconds.
- Step 6) Check "Back Light(XXX)" on the screen, check data increase . You should change Eye Q sensor.

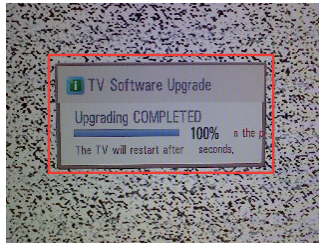
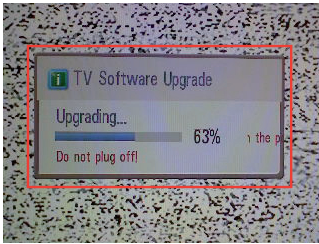


9. USB S/W Download (optional, Service only)

- (1) Put the USB Stick to the USB socket
- (2) Automatically detecting update file in USB Stick
 - If your downloaded program version in USB Stick is lower than that of TV set, it didn't work. Otherwise USB data is automatically detected.
- (3) Show the message "Copying files from memory"



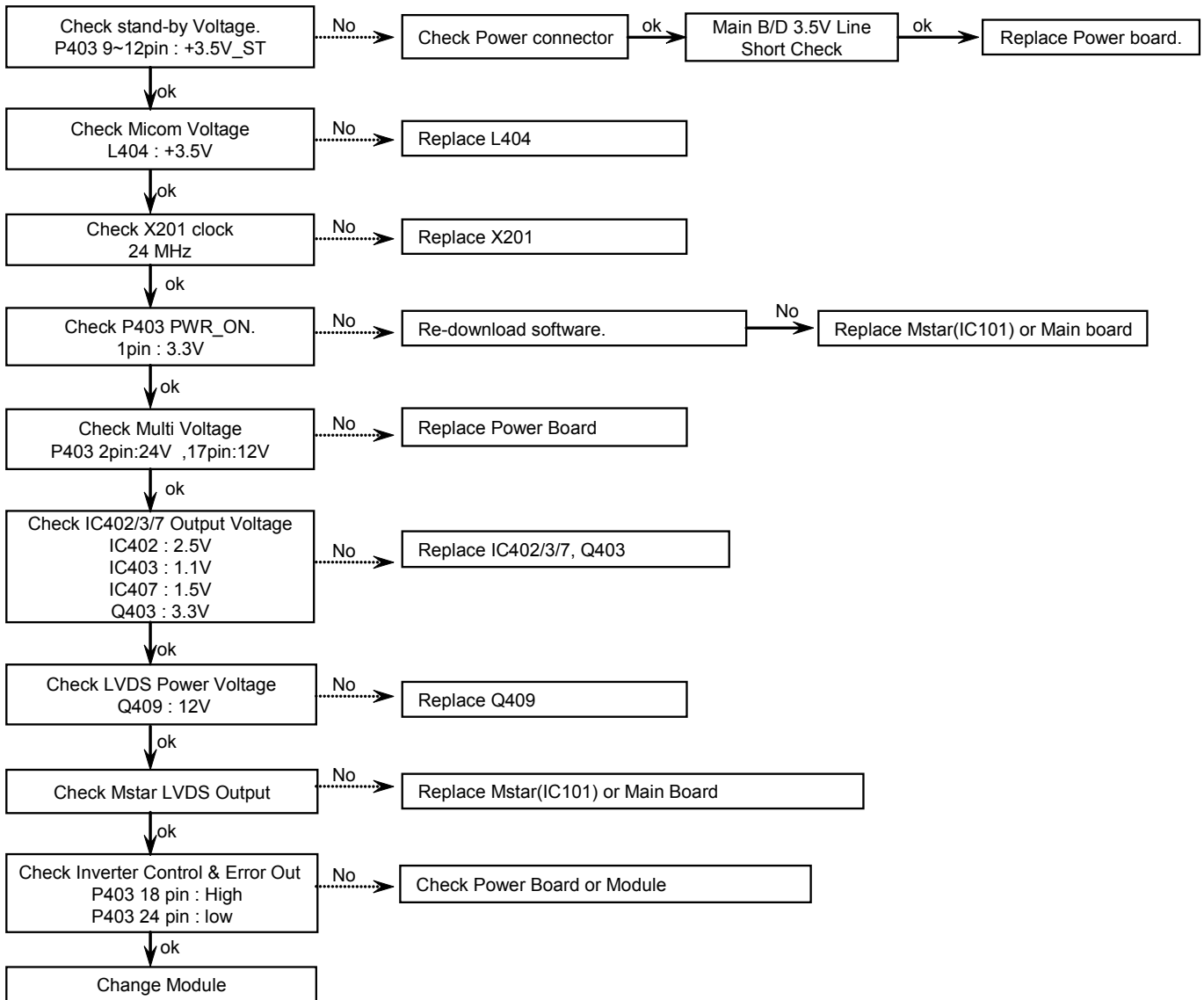
- (4) Updating is starting.



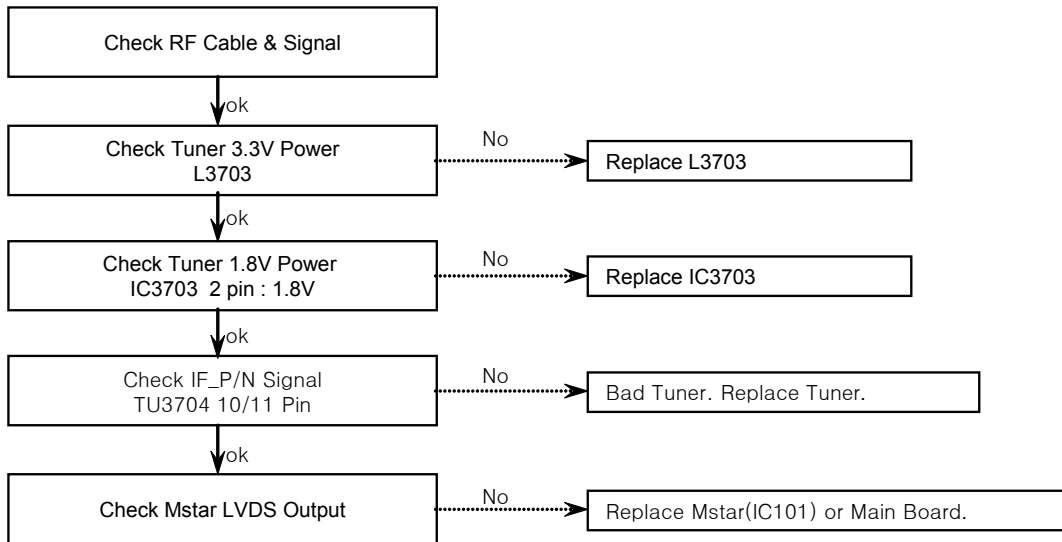
- (5) Updating Completed, The TV will restart automatically
 - (6) If your TV is turned on, check your updated version and Tool option.
- * If downloading version is more high than your TV have, TV can lost all channel data. In this case, you have to channel recover. If all channel data is cleared, you didn't have a DTV/ATV test on production line.
- * After downloading, TOOL OPTION setting is needed again.
- (1) Push "IN-START" key in service remote controller.
 - (2) Select "Tool Option 1" and Push "OK" button.
 - (3) Punch in the number. (Each model has their number.)

TROUBLE SHOOTING

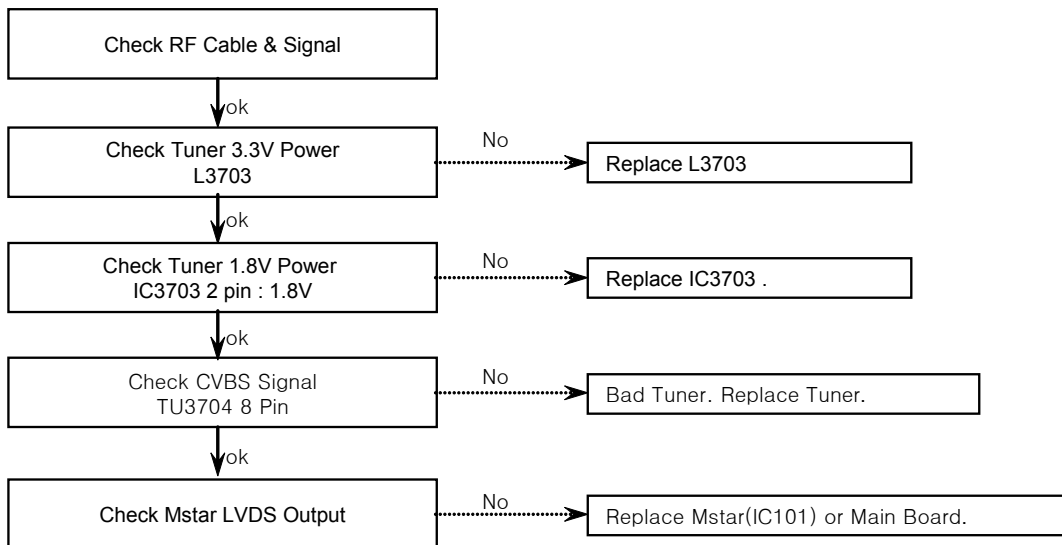
1. Power-up boot check



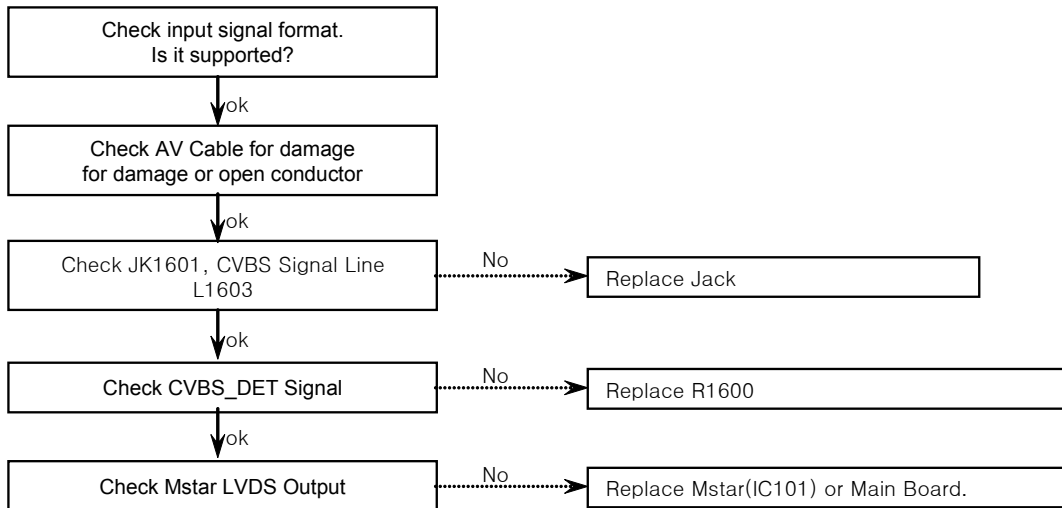
2. Digital TV Video



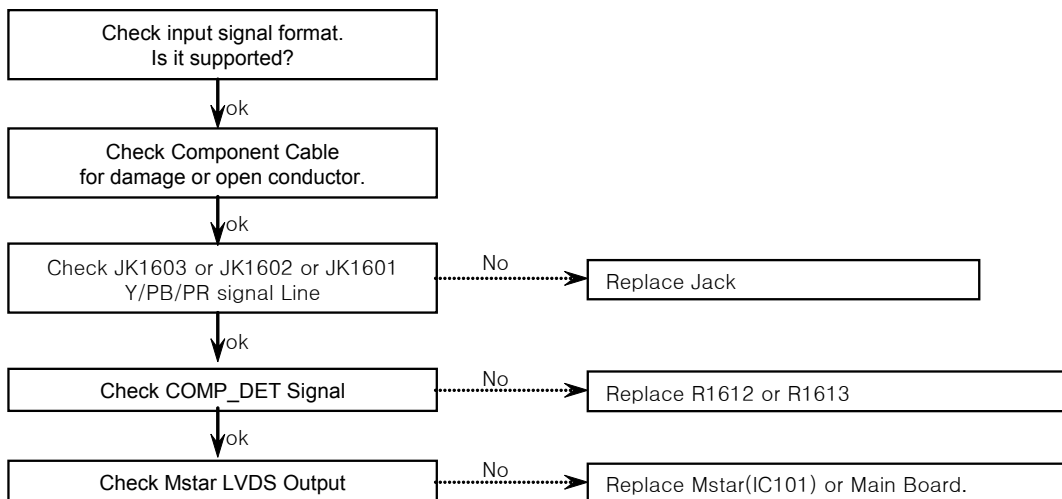
3. Analog TV Video



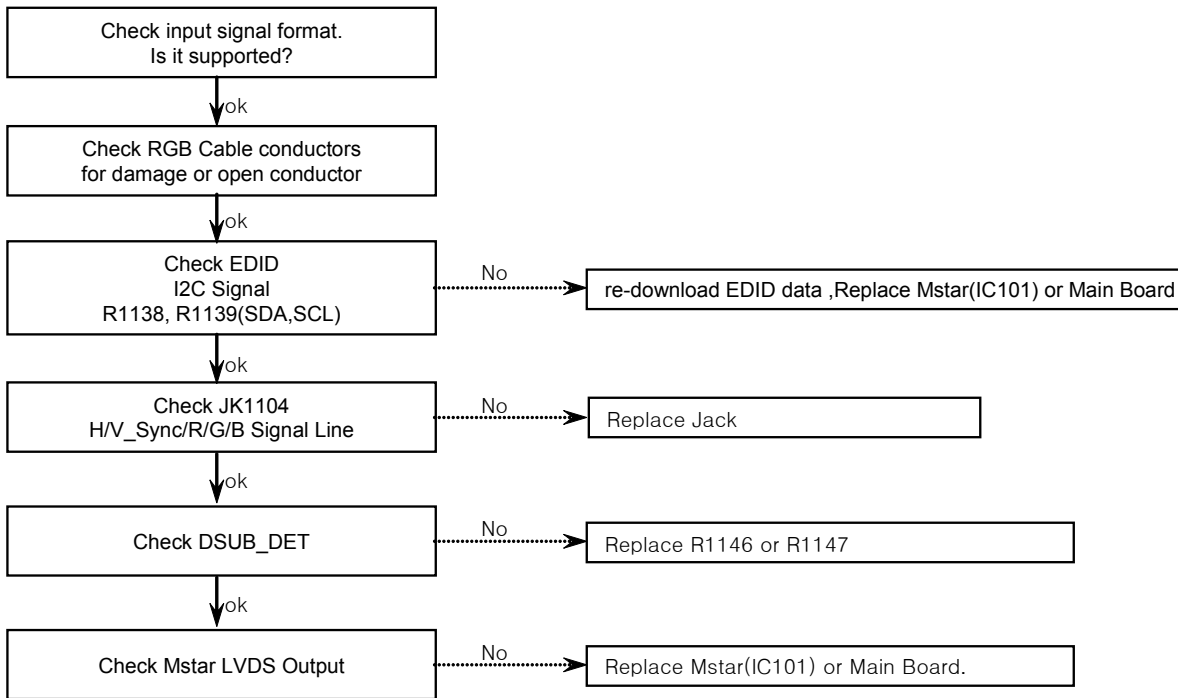
4. AV Video



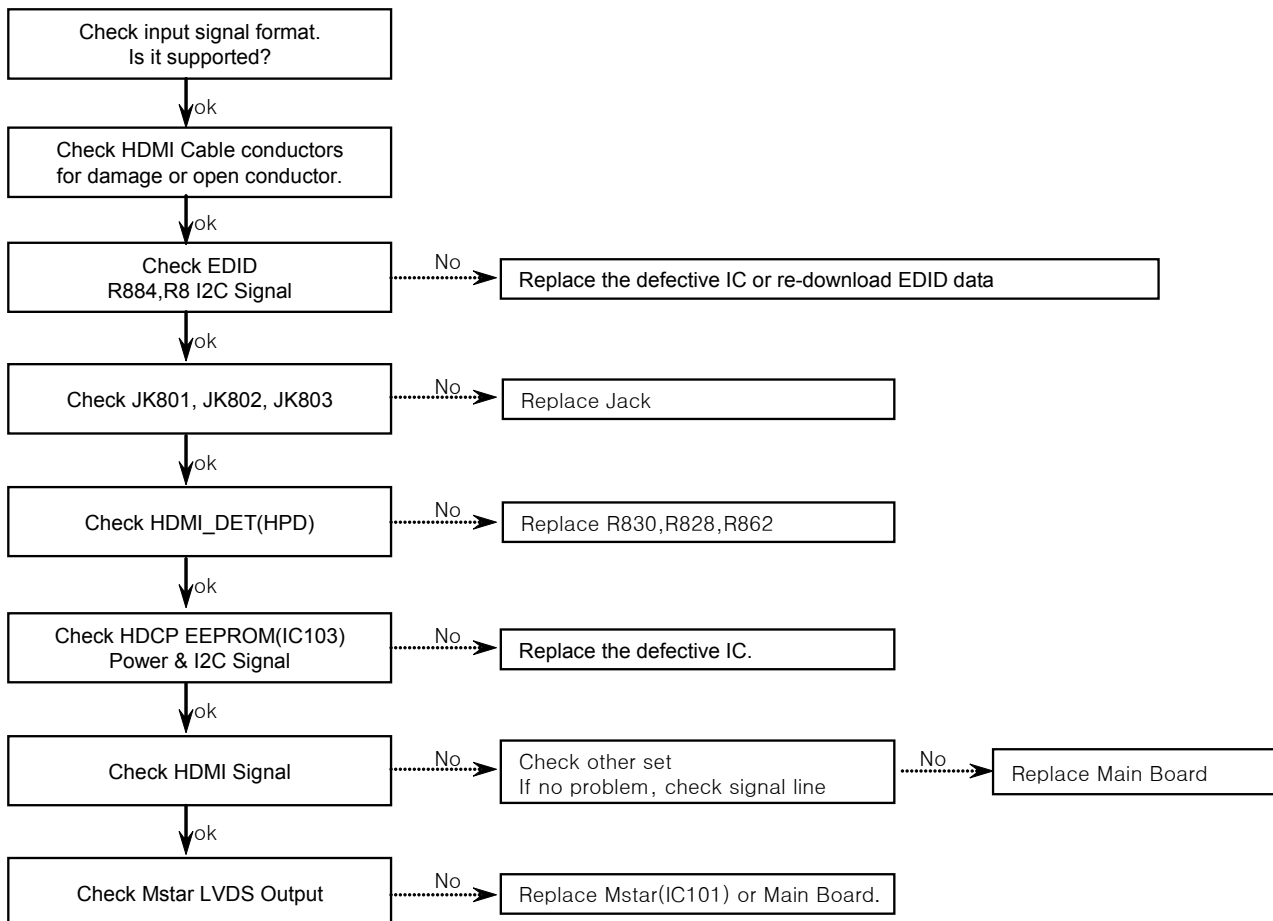
5. Component Video



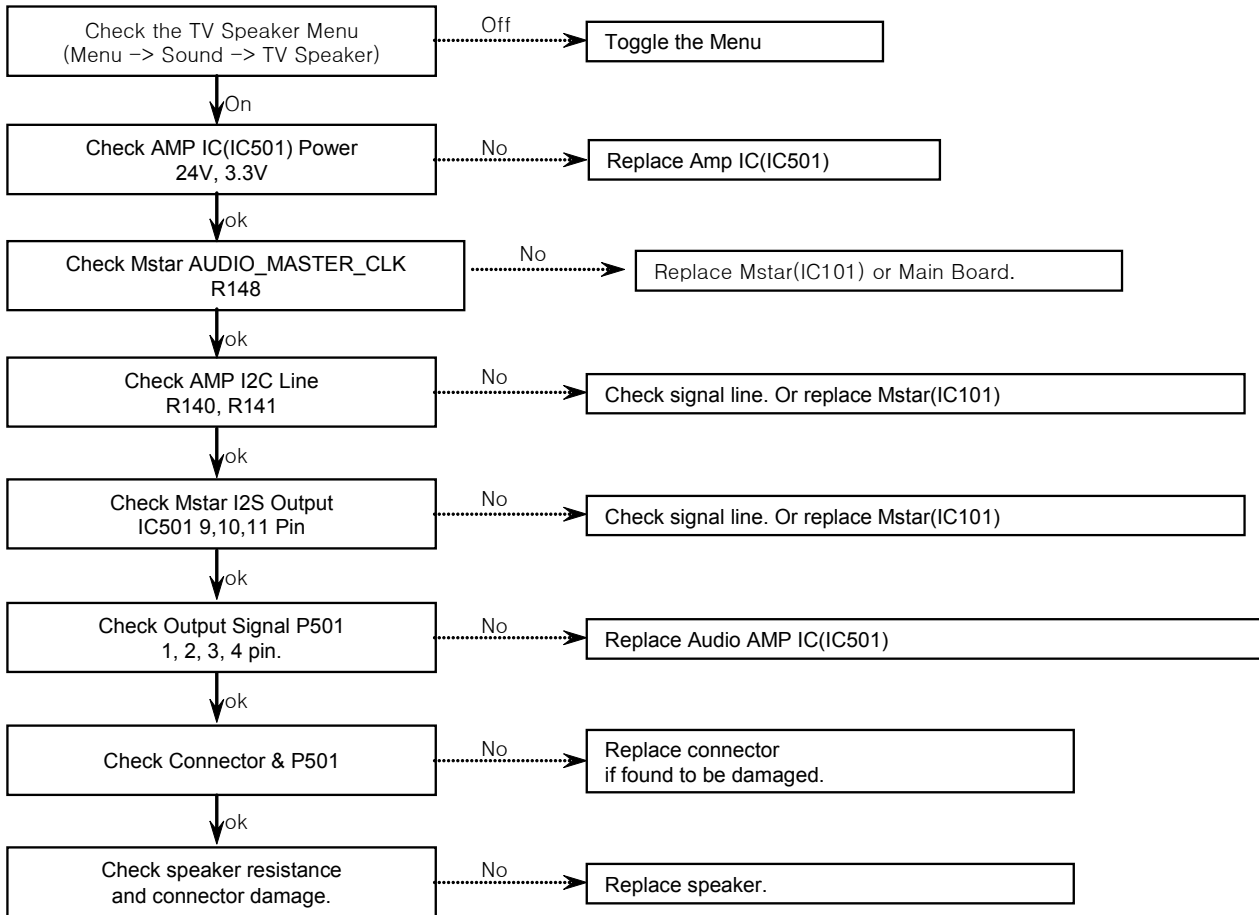
6. RGB Video



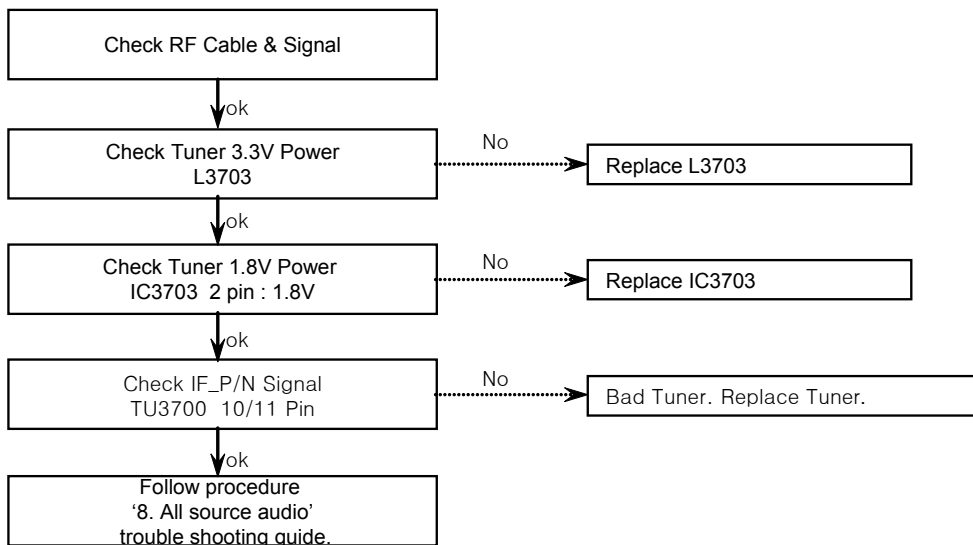
7. HDMI Video



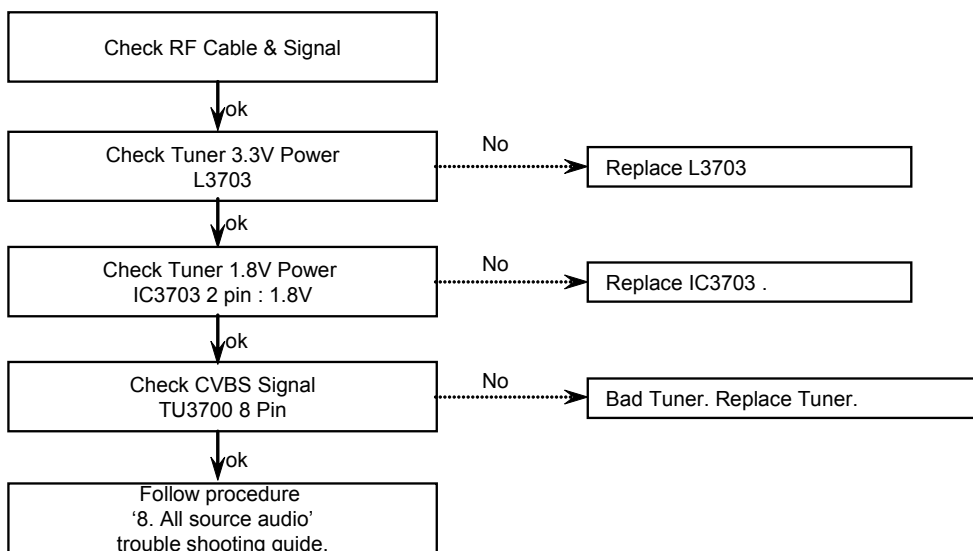
8. All Source Audio



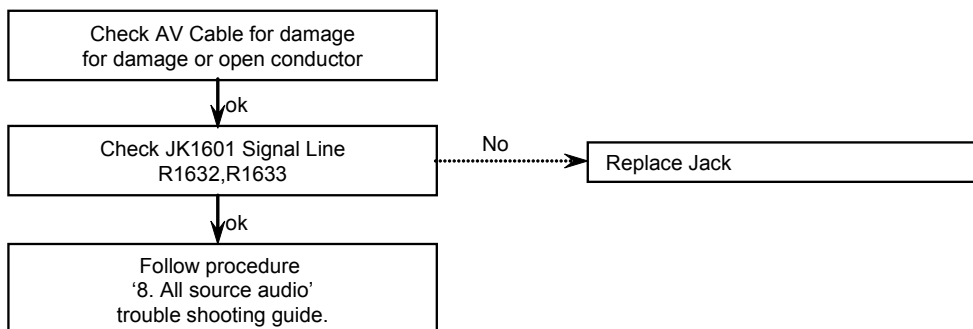
9. Digital TV Audio



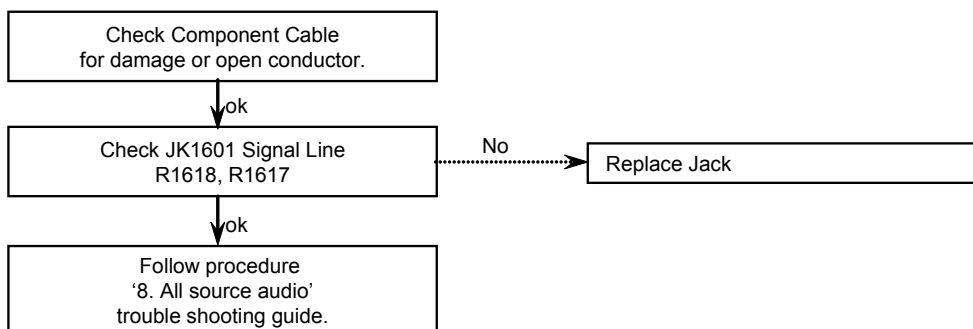
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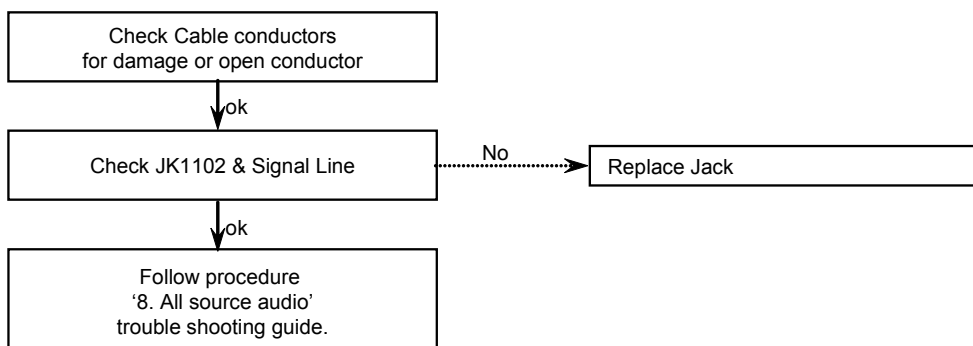
11. AV Audio



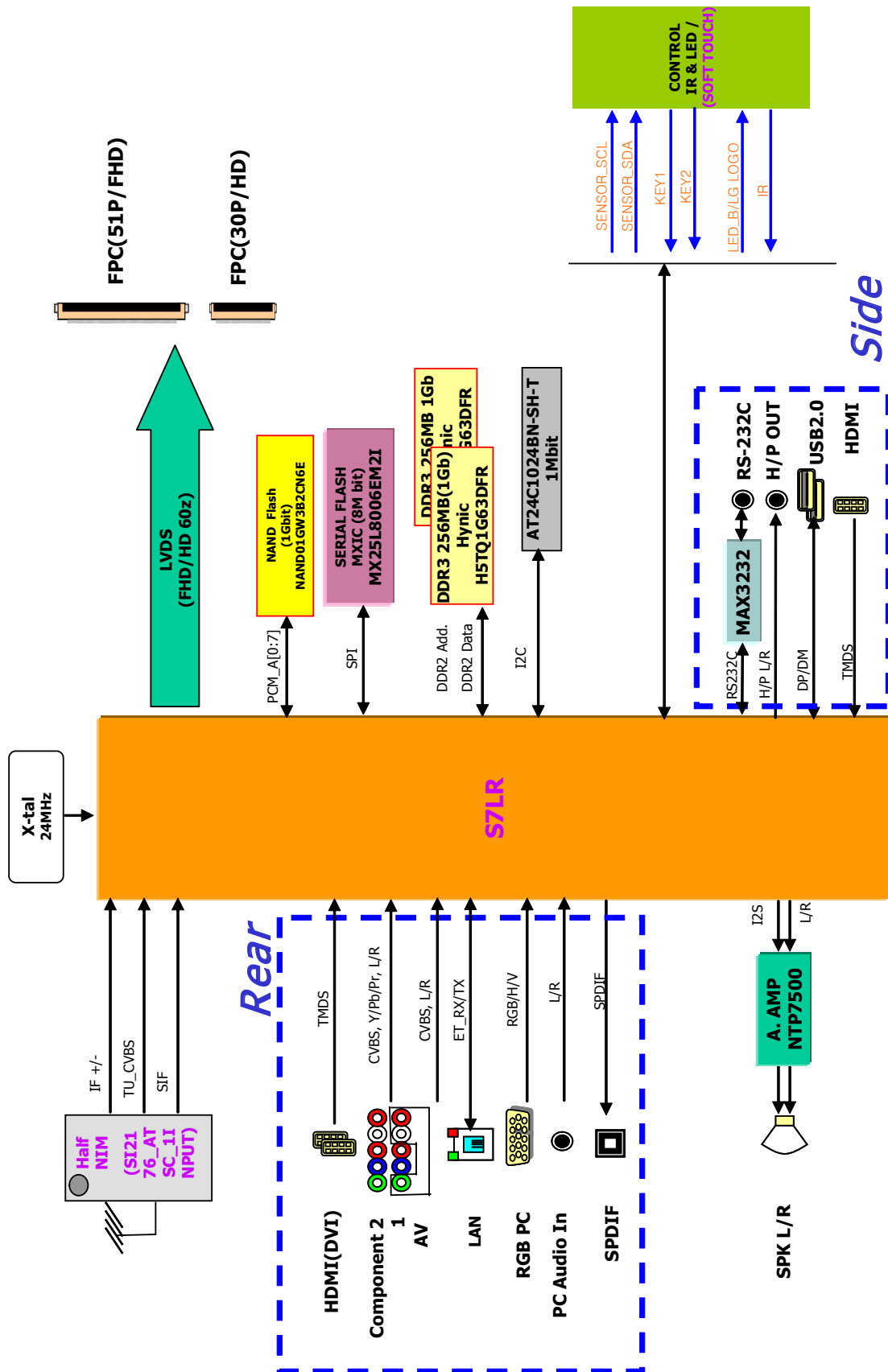
12. Component Audio



13. RGB Audio



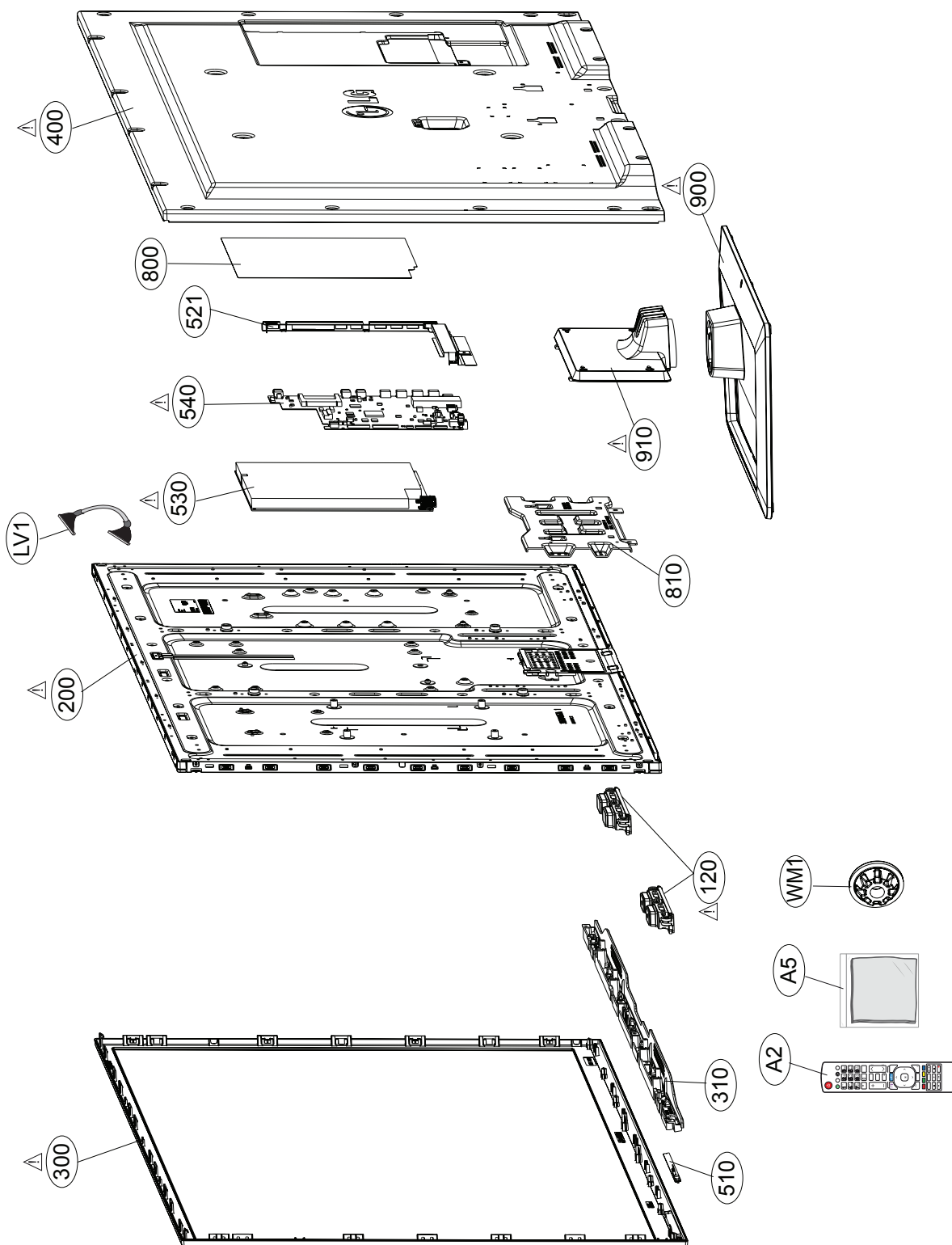
BLOCK DIAGRAM

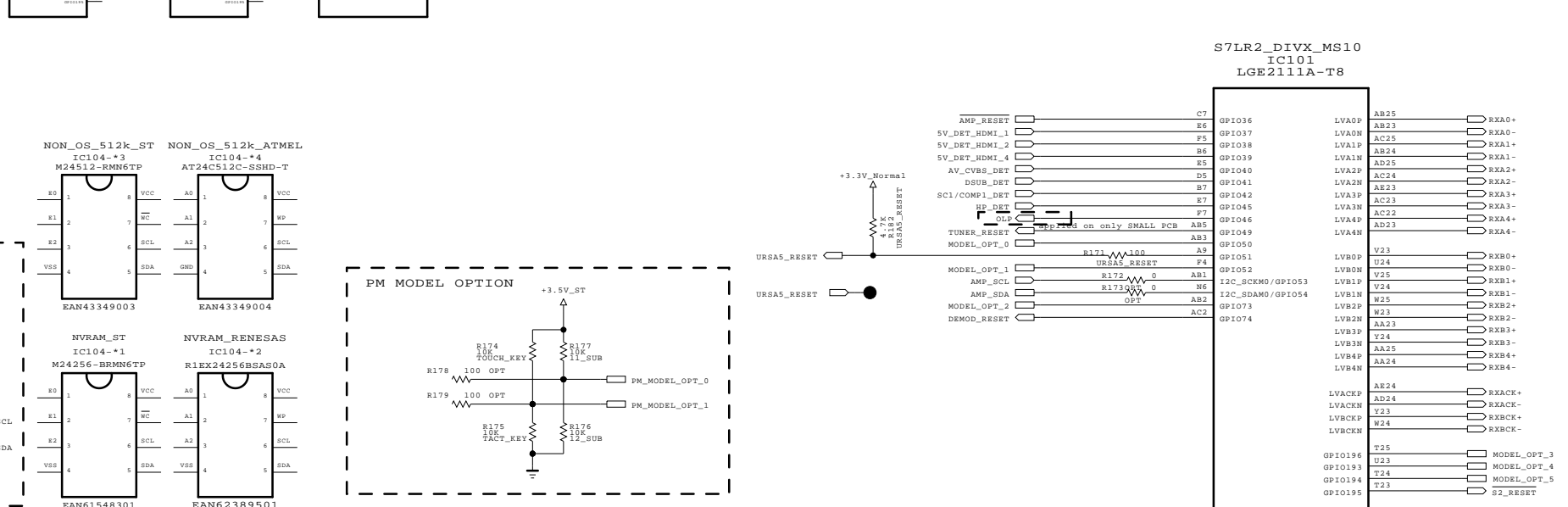
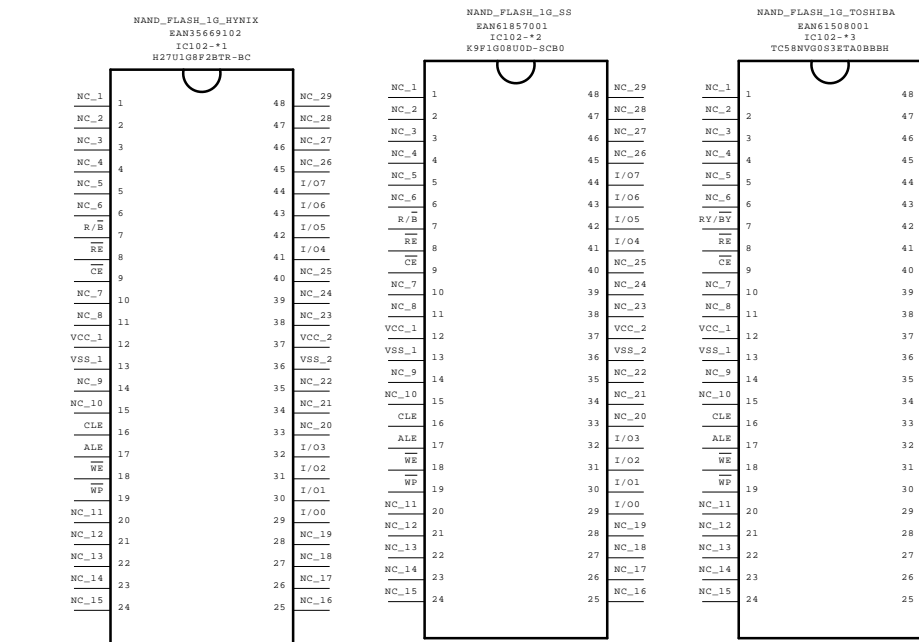
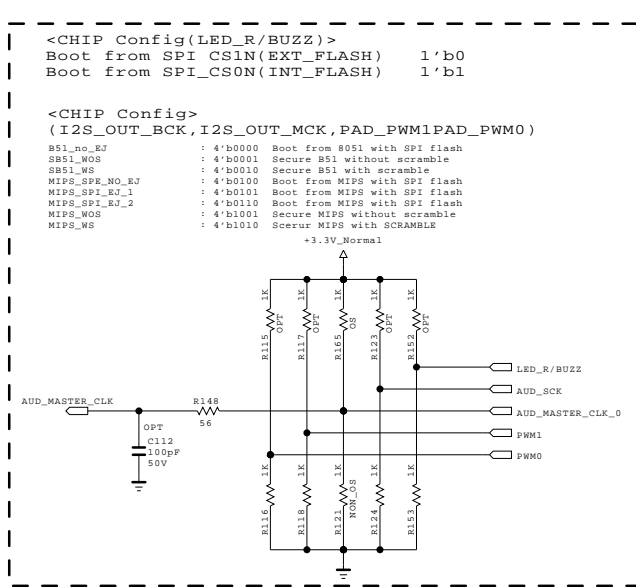


EXPLODED VIEW

IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by \triangle in the Schematic Diagram and EXPLODED VIEW. It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent X-RADIATION, Shock, Fire, or other Hazards. Do not modify the original design without permission of manufacturer.

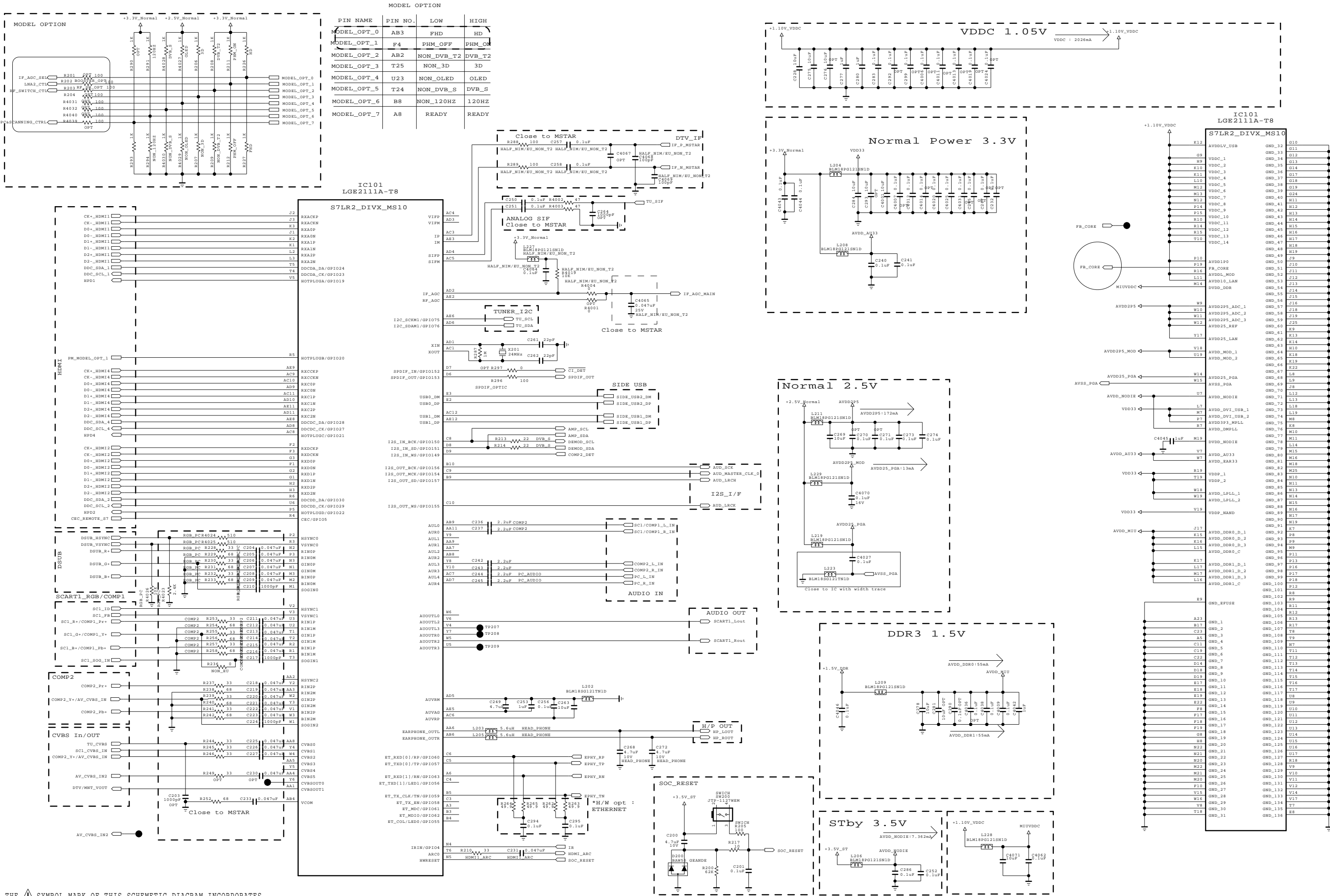




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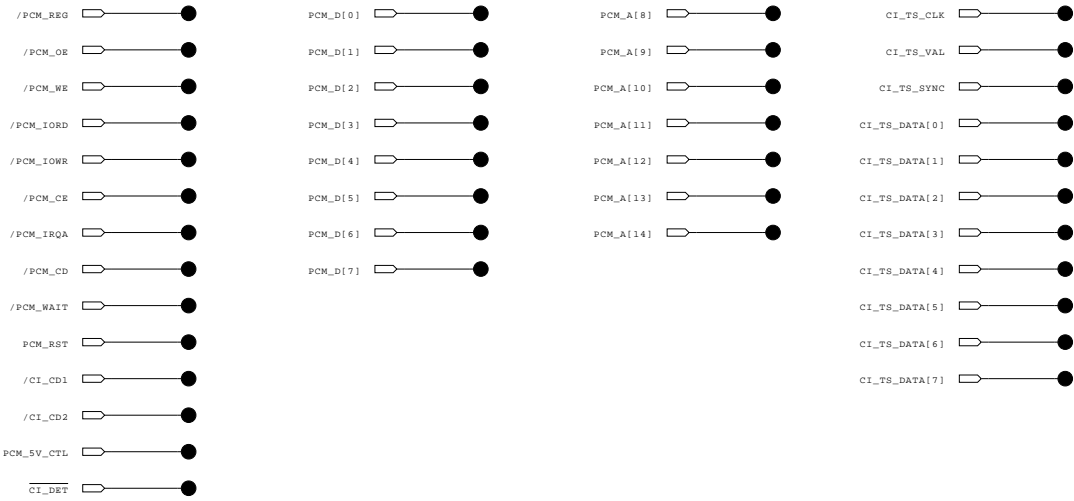


MODEL	GP4L_S7LR2	DATE	2011.11.16
BLOCK	FLASH/EEPROM/GPIO	SHEET	1 /

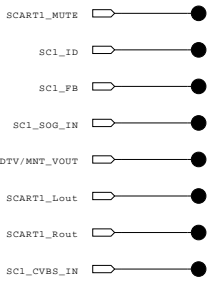


TP for NON-EU models(except EU and China)

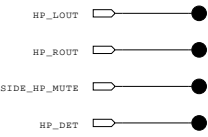
TP for CI slot



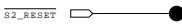
TP for SCART





TP for Headphone



TP for S2



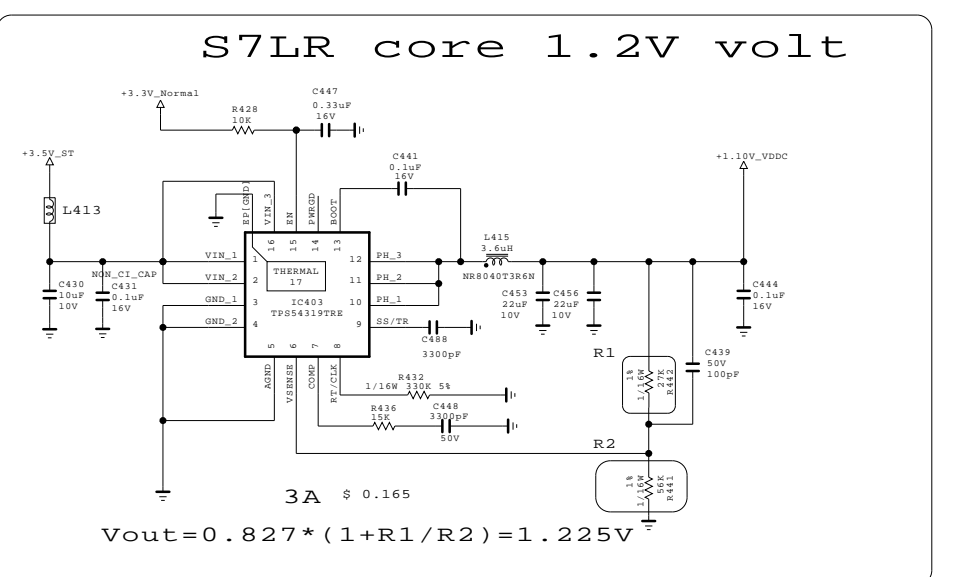
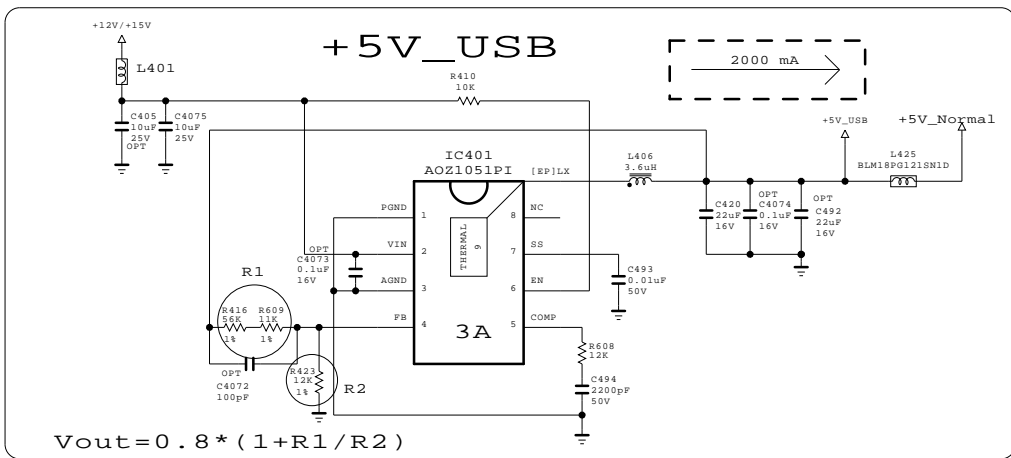
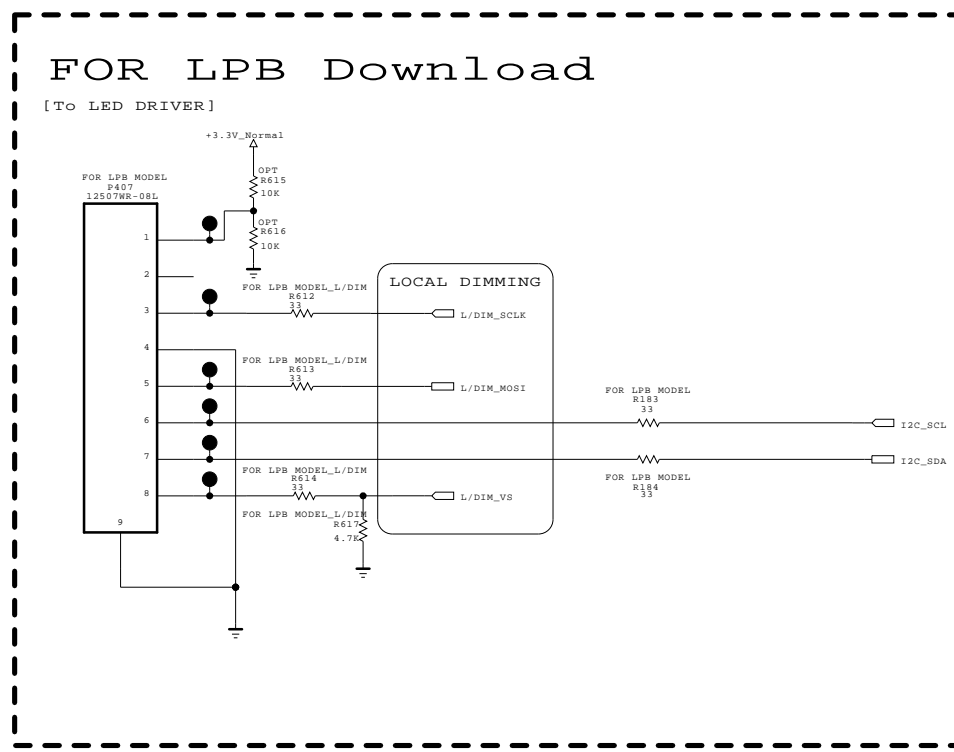
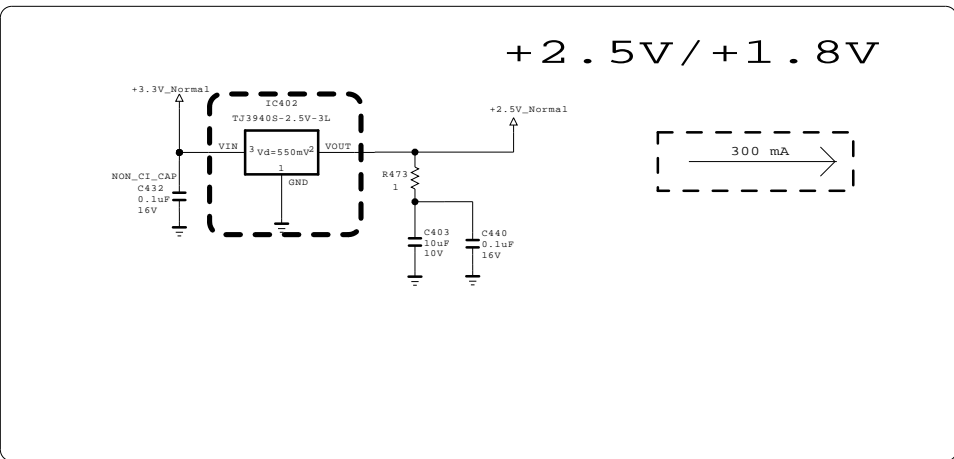
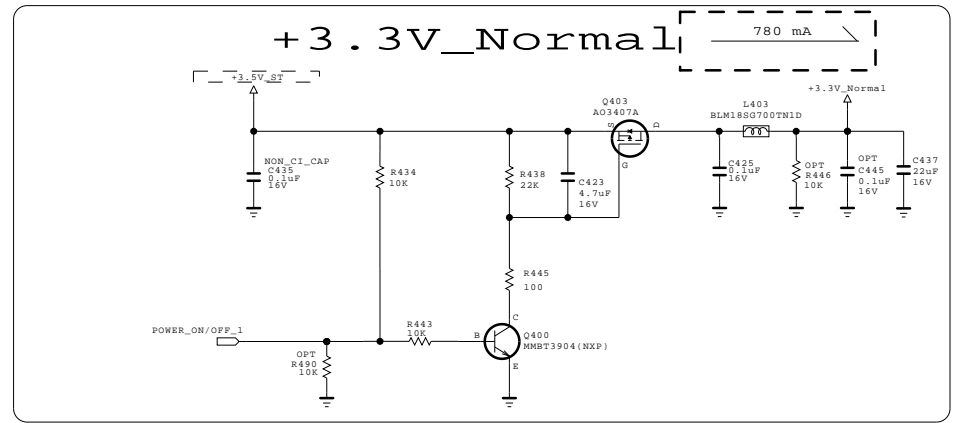
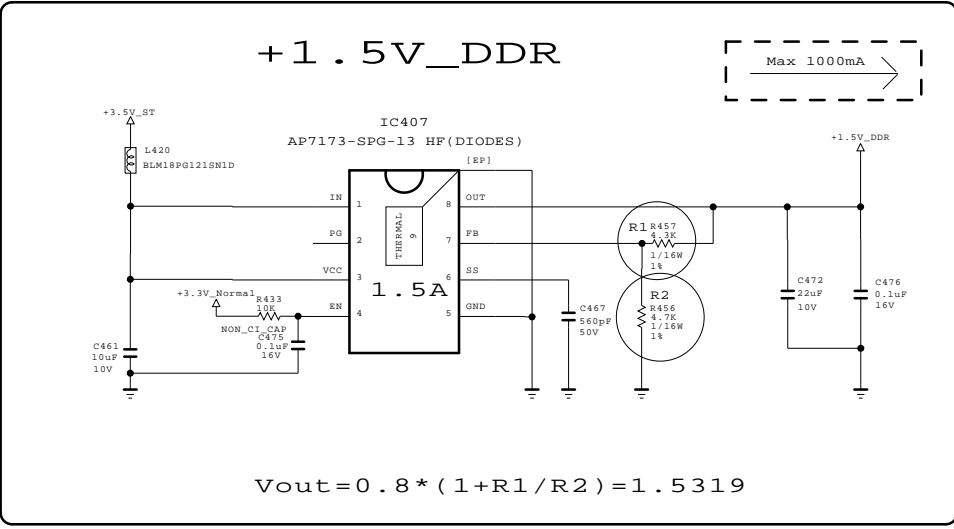
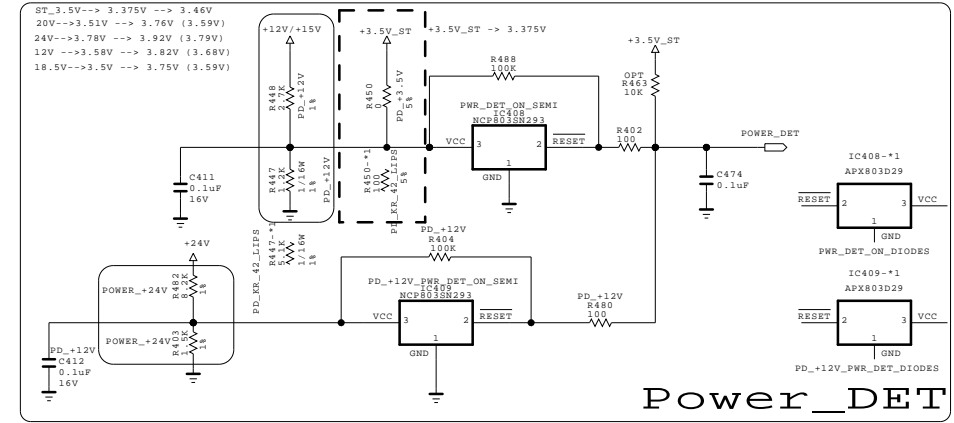
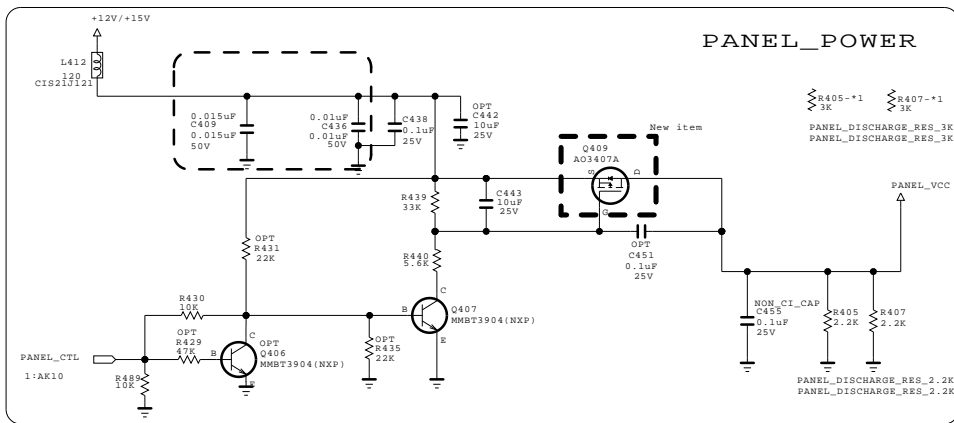
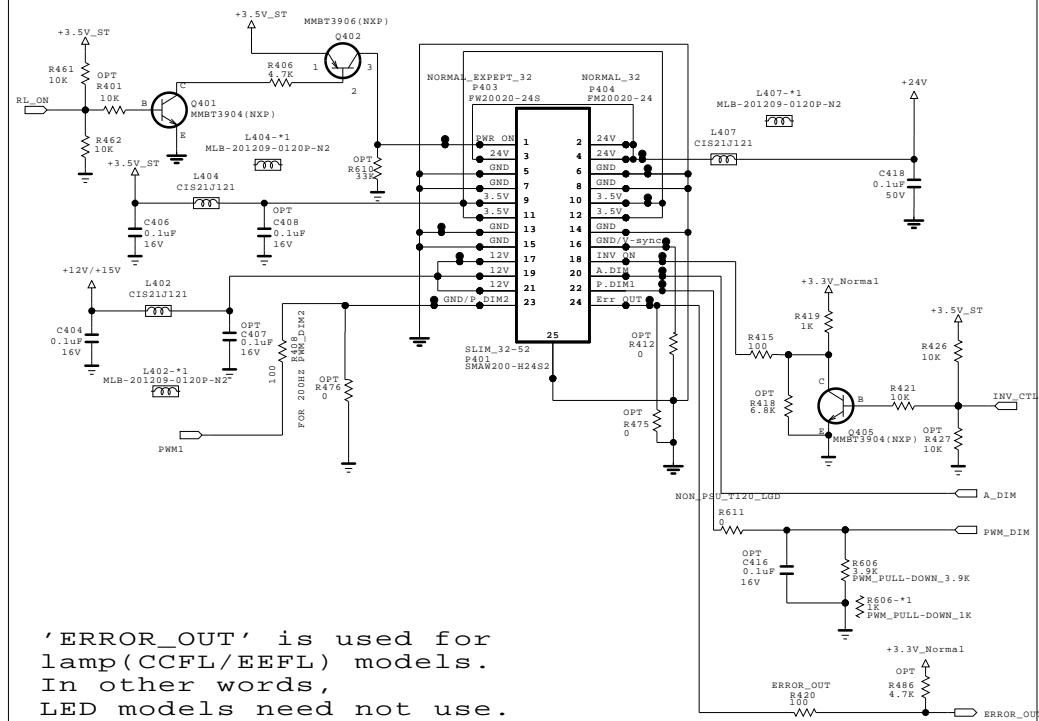
THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.



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MODEL	GP4_S7LR2	DATE	2011.07.07
BLOCK	TP_NON_EN	SHEET	3 /

FROM LIPS & POWER B/D



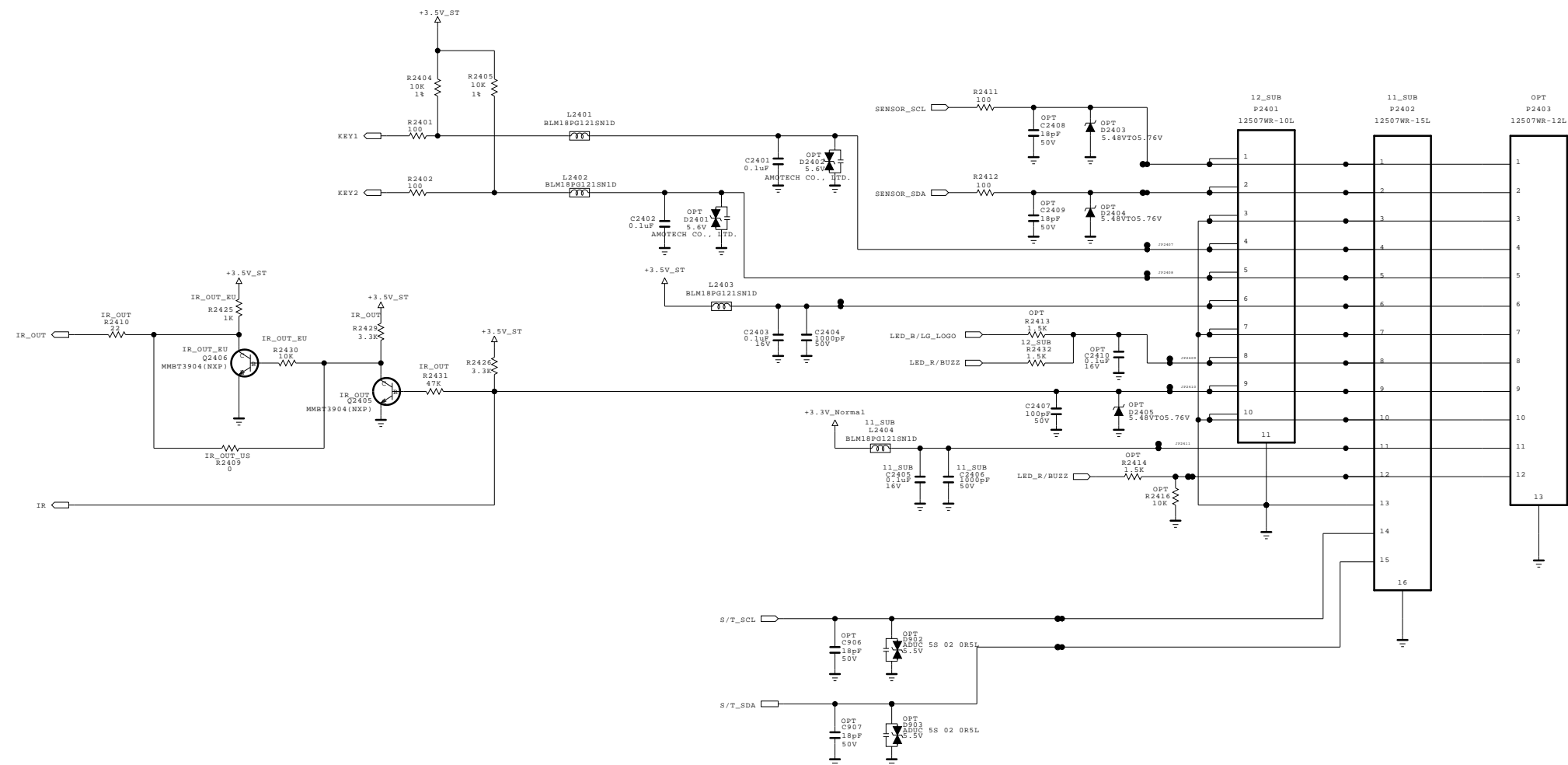
THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

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MODEL	GP4L_S7LR2	DATE	2011/11.14
BLOCK	POWER_LARGE	SHEET	4

IR/LED and control for normal models.



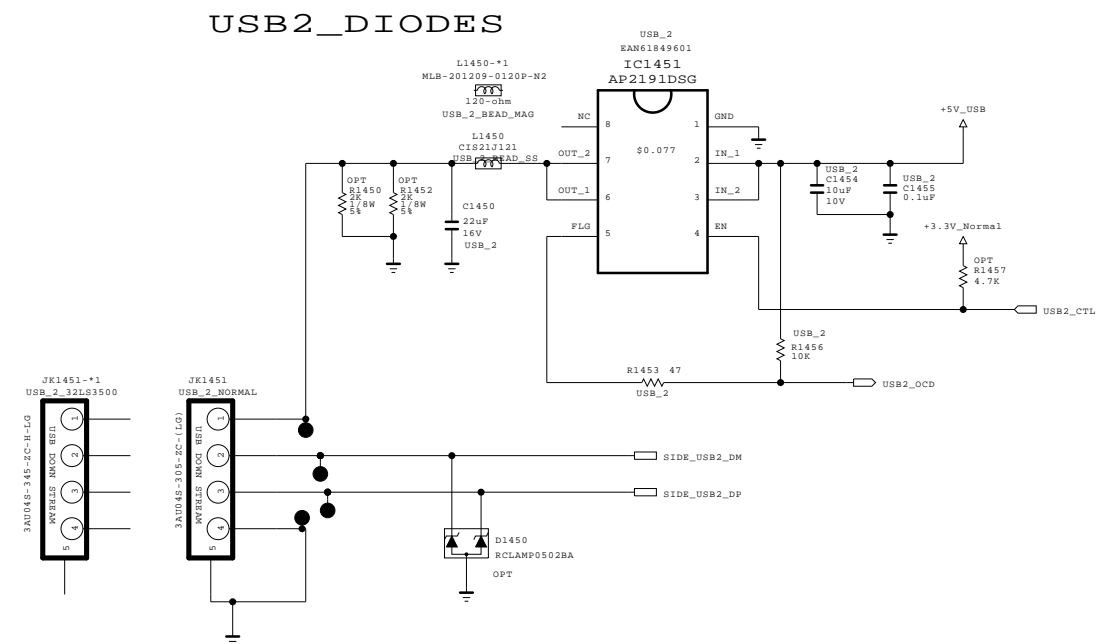
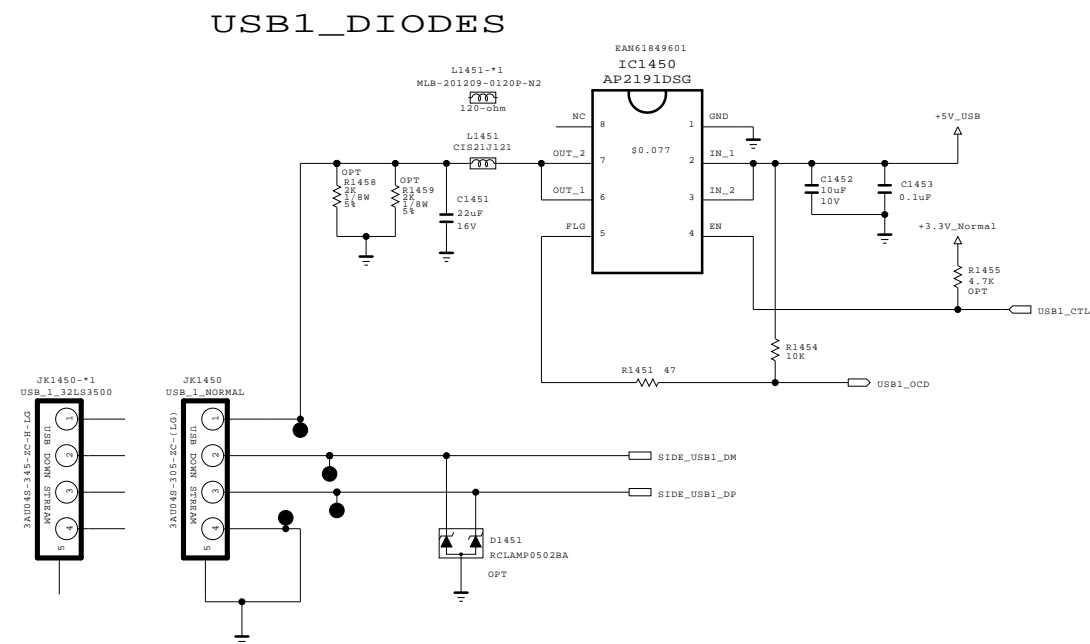
THE ⚠ SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMATIC.

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MODEL	GP4L_S7LR2	DATE	2011/11/16
PACK	IR/CONTROL	SHEET	6 /

USB (SIDE)



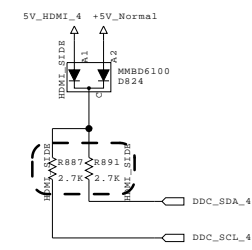
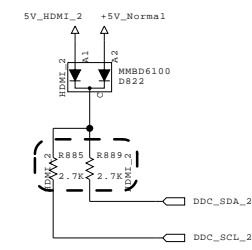
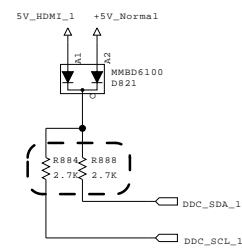
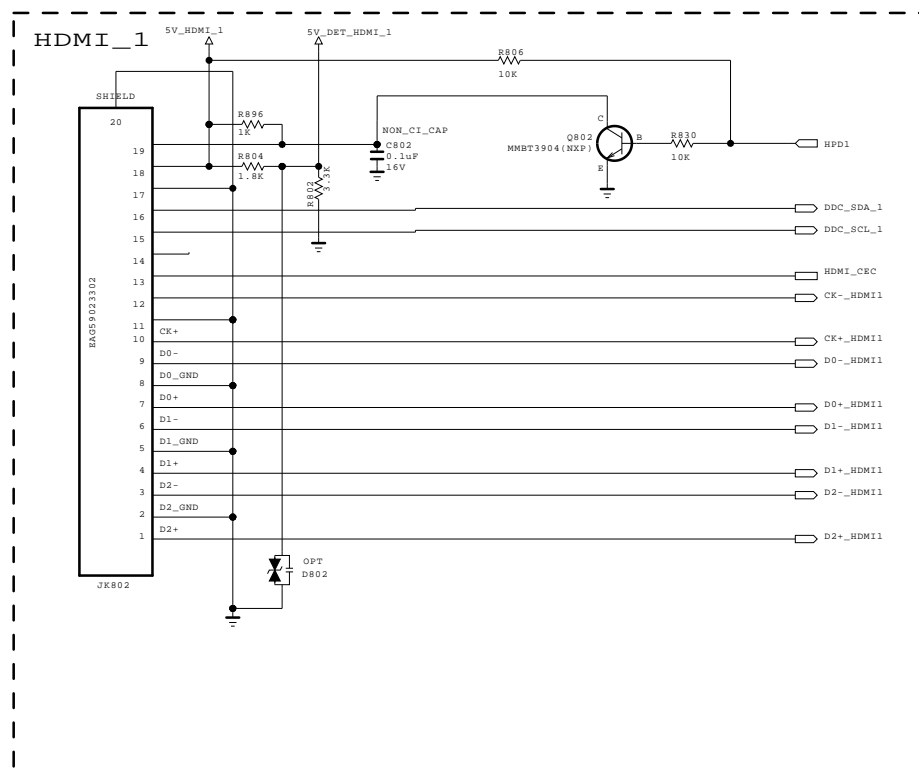
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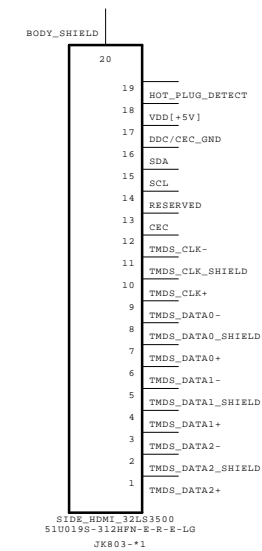
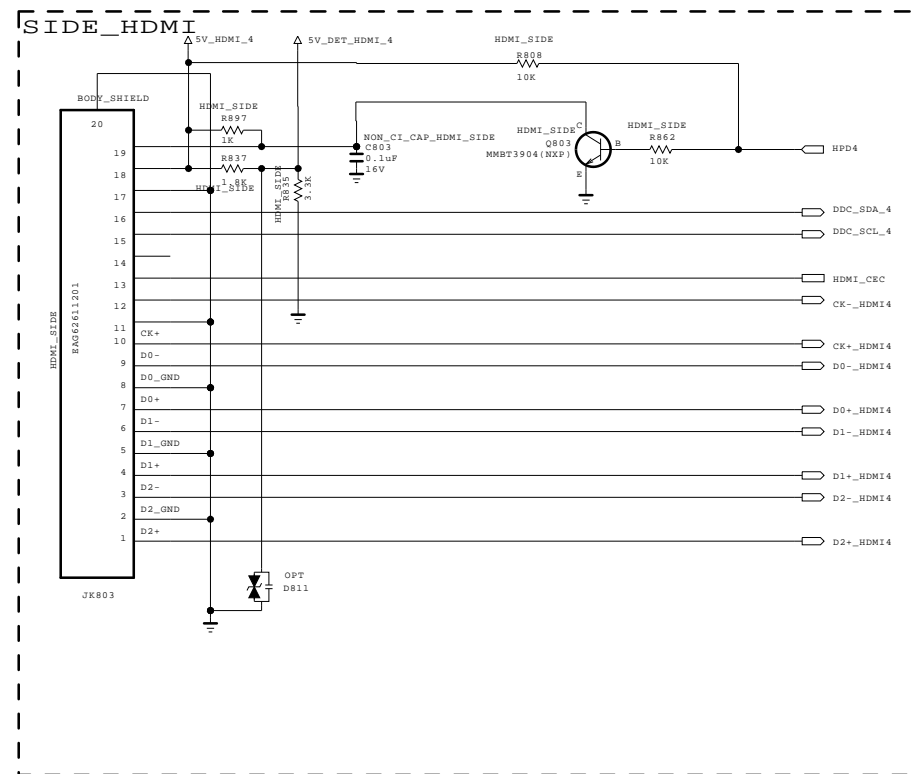
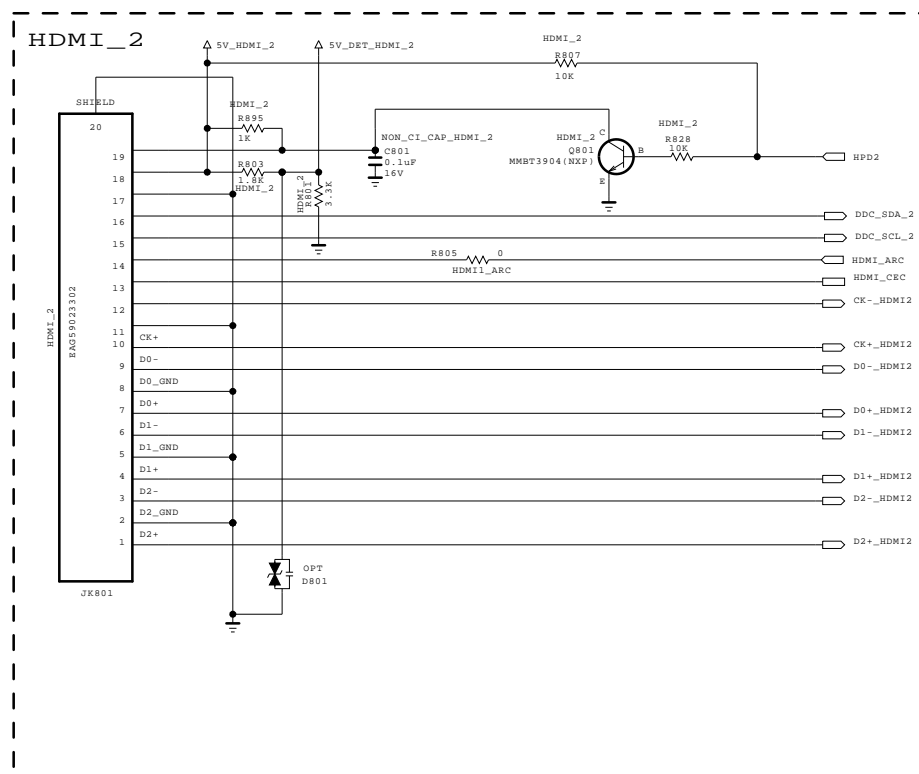


MODEL	GP4_S7LR2	DATE	10/08/13
BLOCK	USB_OCP_DIODE	SHEET	7 /

HDMI



For CEC



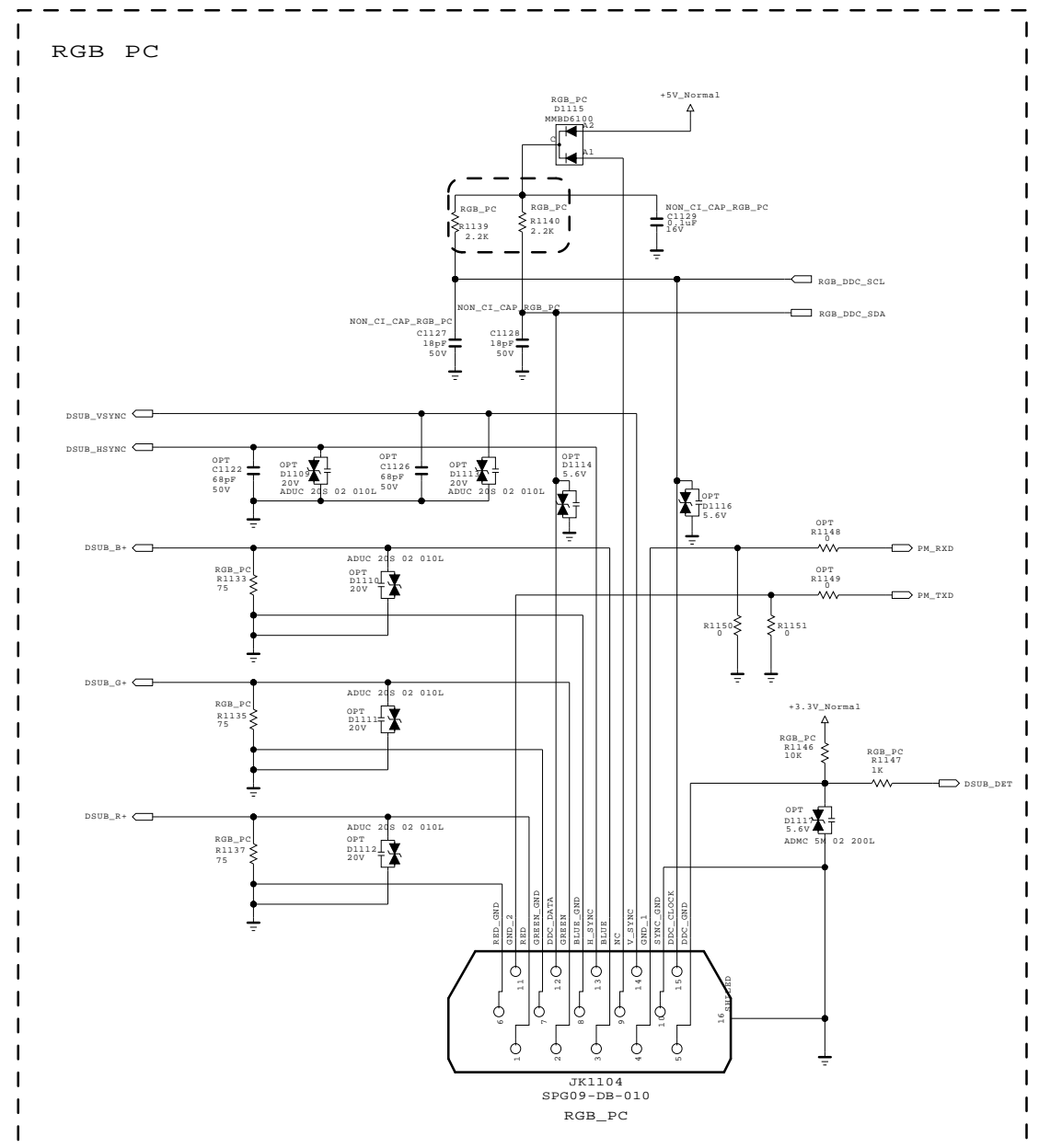
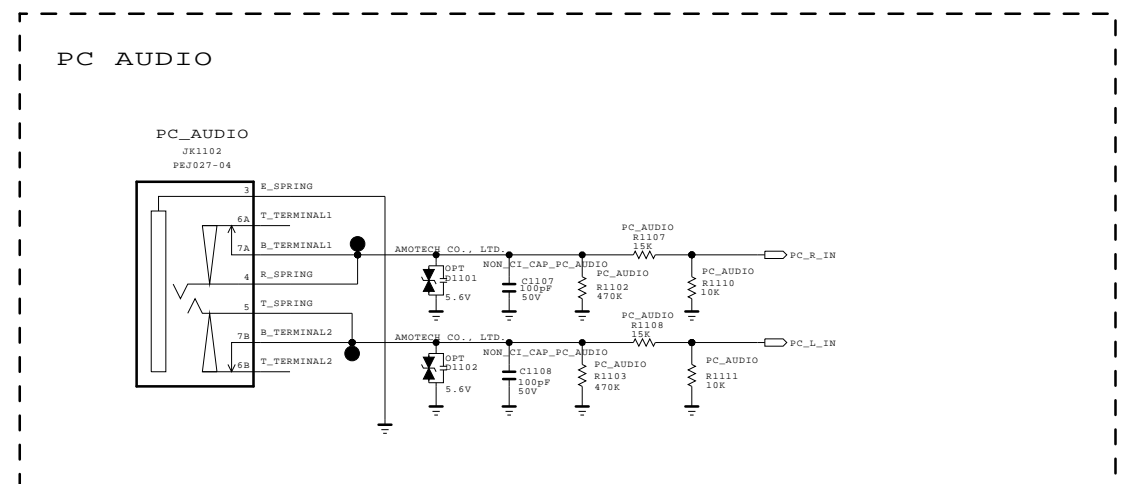
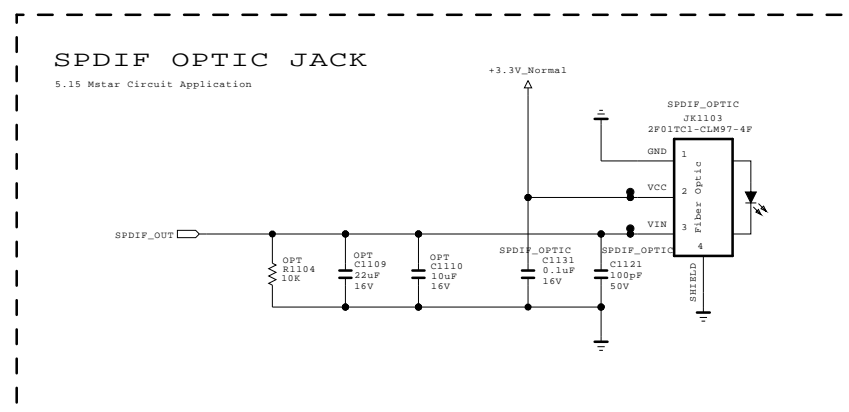
THE ⚠ SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMATIC.



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Electronic



MODEL	GP4L_S7LR2	DATE	2011.10.04
BLOCK	HDMI	SHEET	8 /

RGB-PC / SPDIF



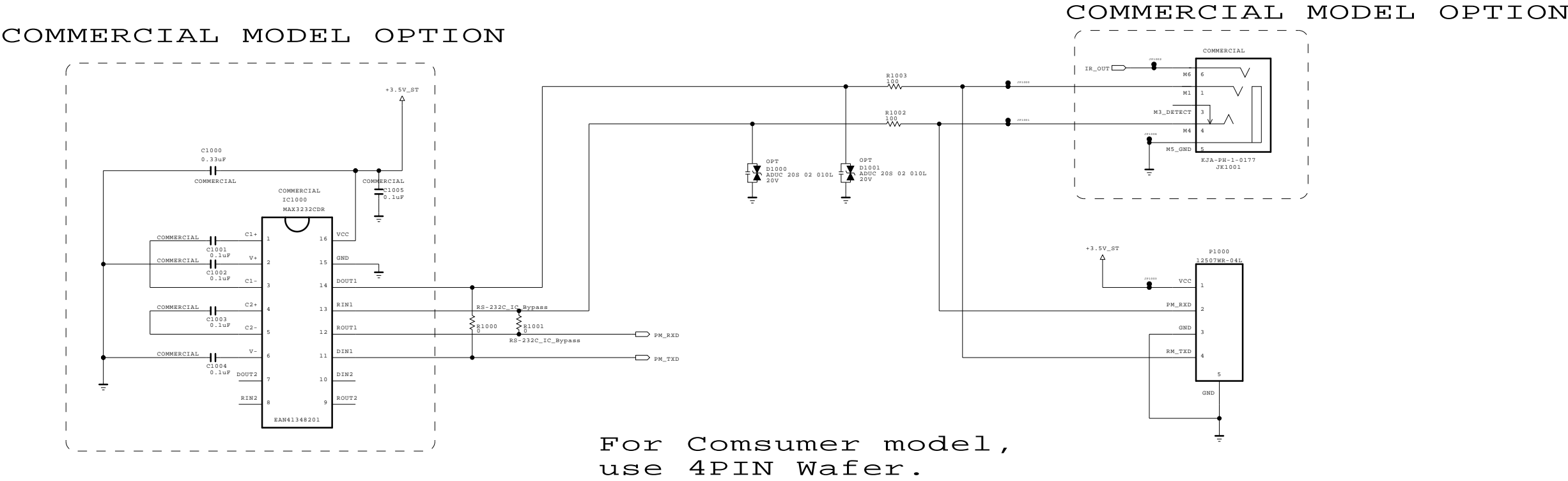
THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.



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LGElectronics



MODEL	GP4L_S7LR2	DATE	2011/09/27
PORT	RGB-PC/SPDIF	SHEET	9 /

RS-232C



THE  SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMATIC.

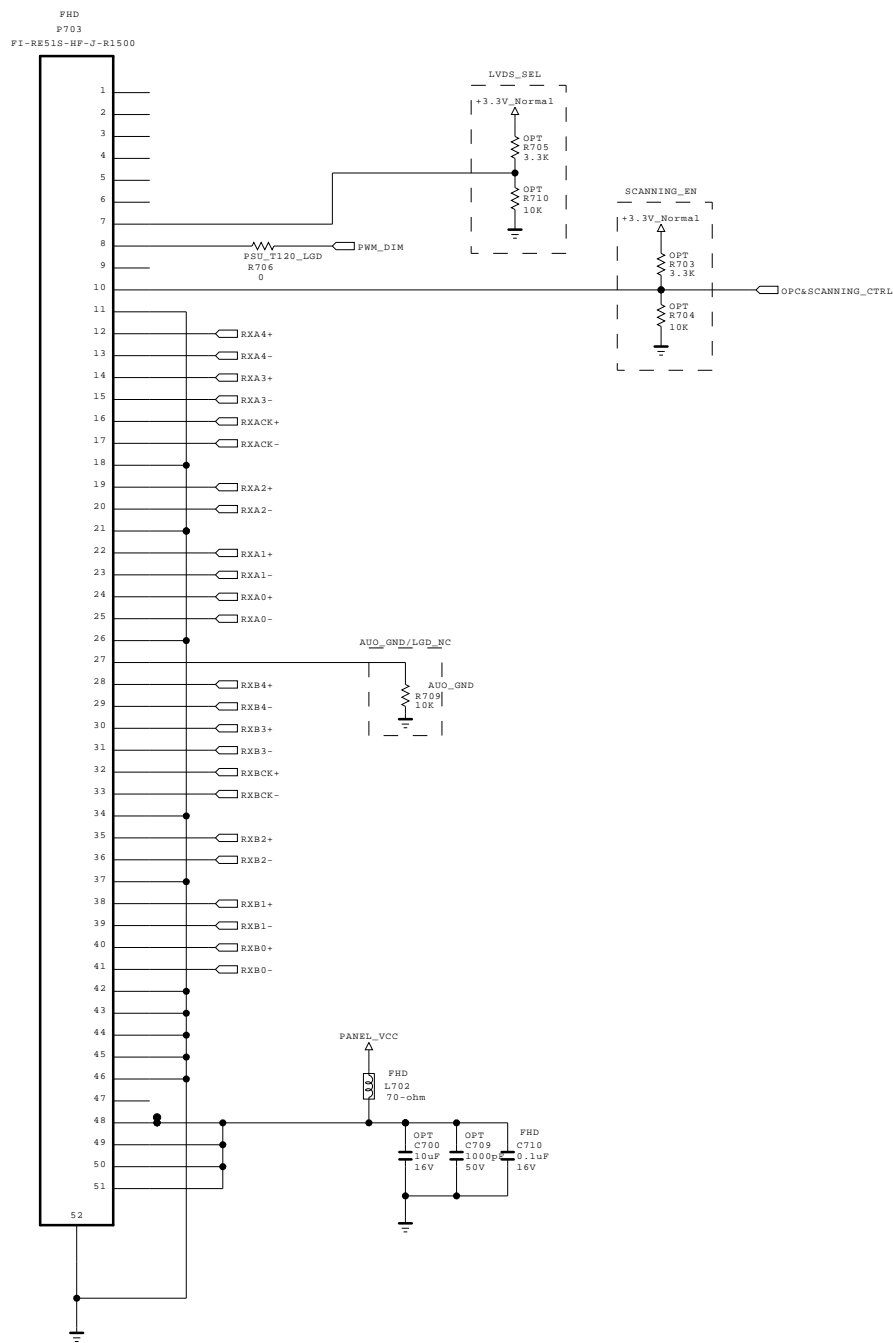
SECRET
LGElectronics



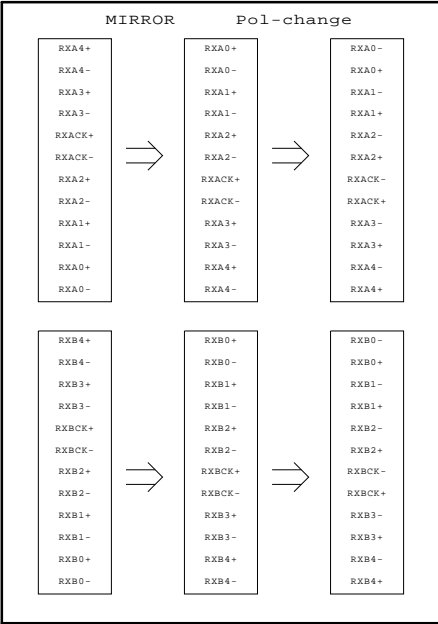
MODEL	GP4L_S7LR2	DATE	2011/08/13
BLOCK	RS232C_PHONE	SHEET	10 /

LVDS for large inch

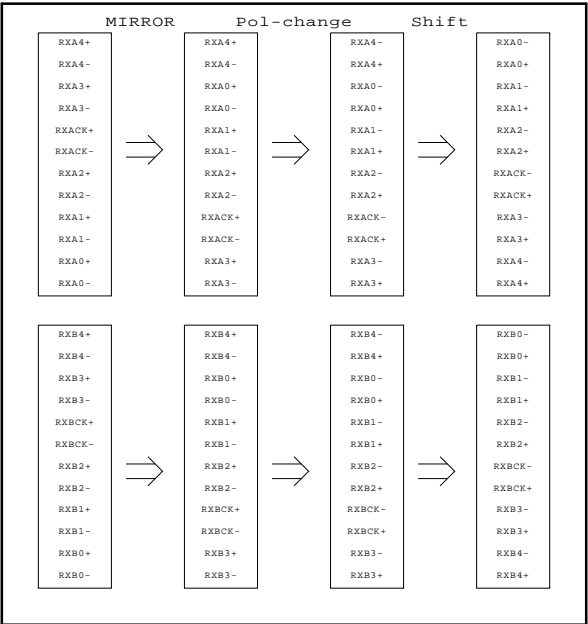
[51Pin LVDS Connector]
(For FHD 60Hz)



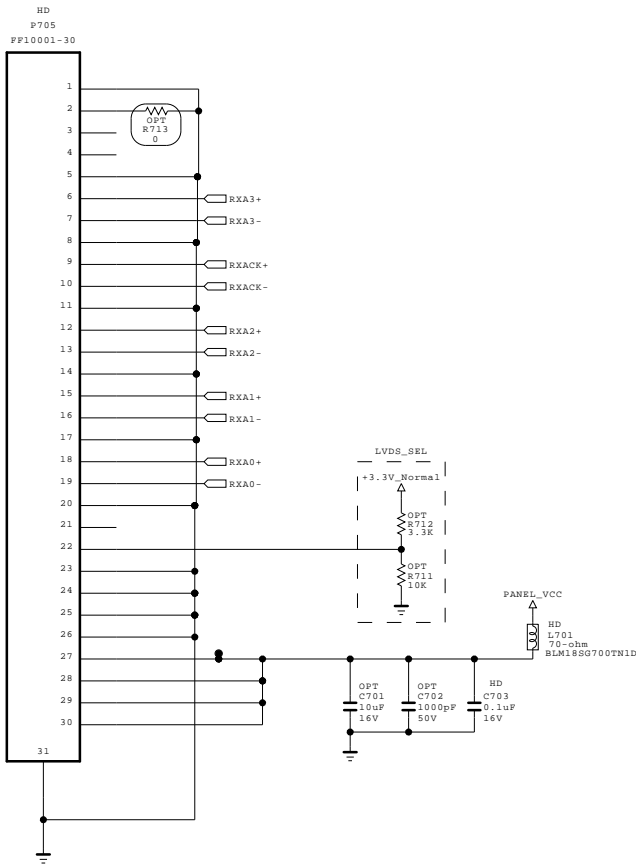
FOR FHD REVERSE(10bit)
Change in S7LR





FOR FHD REVERSE(8bit)
Change in S7LR



[30Pin LVDS Connector]
(For HD 60Hz_Normal)

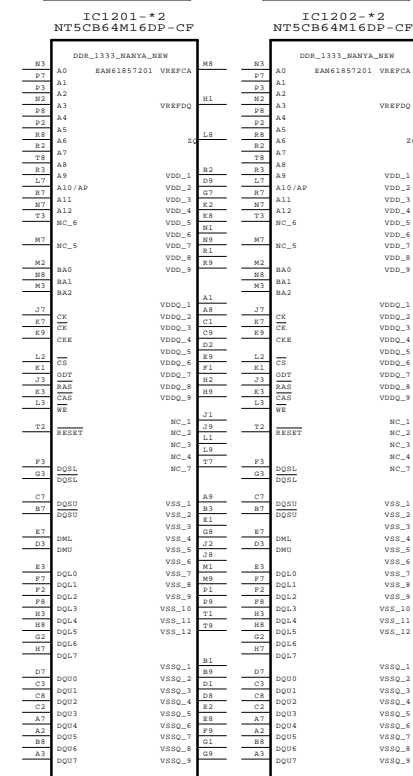
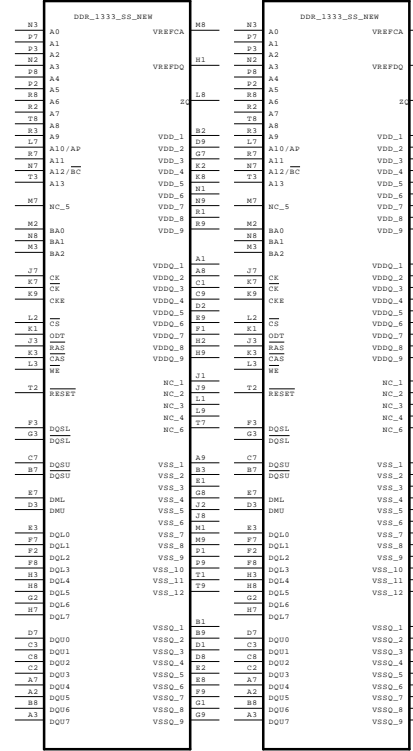


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MODEL	GP4L_S7LR2	DATE	2011/11/14
BLOCK	LVDS_LARGE	SHEET	11 /



MODEL	GP4L_S7LR2	DATE	2011/06/03
BLOCK	DDR_256	SHEET	12 /

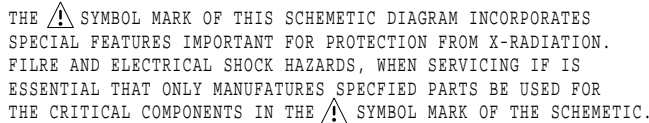
FE_AGC_SPEED_CTL
IF_AGC_SEL

DEMOD_RESET

FE_BOOSTER_CTL
LNA2_CTL

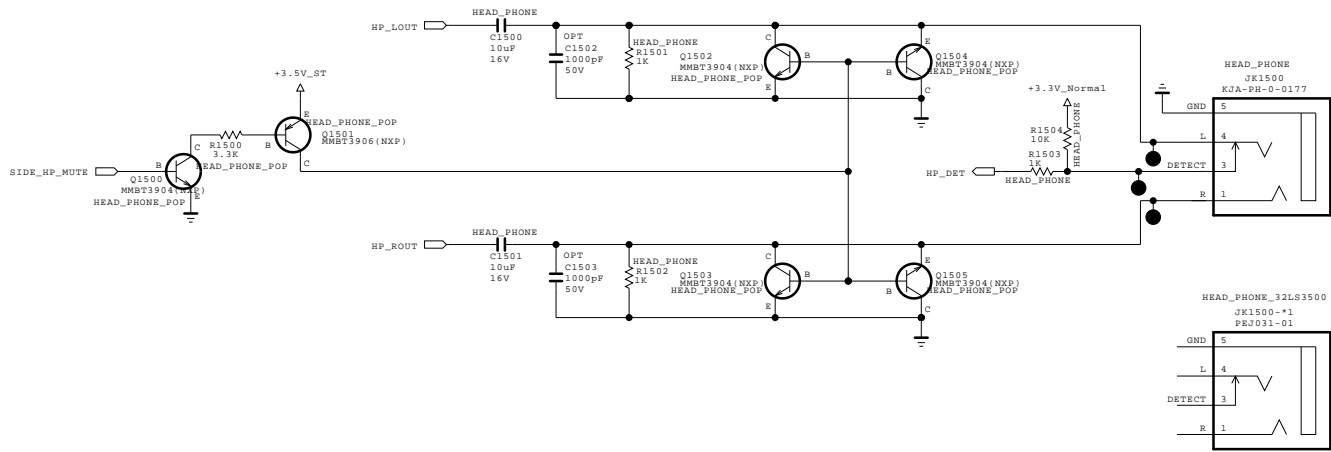
DEMOD_SCL



DEMOD_SDA



MODEL	GP4L_S7LR2	DATE	2011.10.11
BLOCK	TUNER_NON_EU	SHEET	14 /

Headphone *Option : HEAD_PHONE



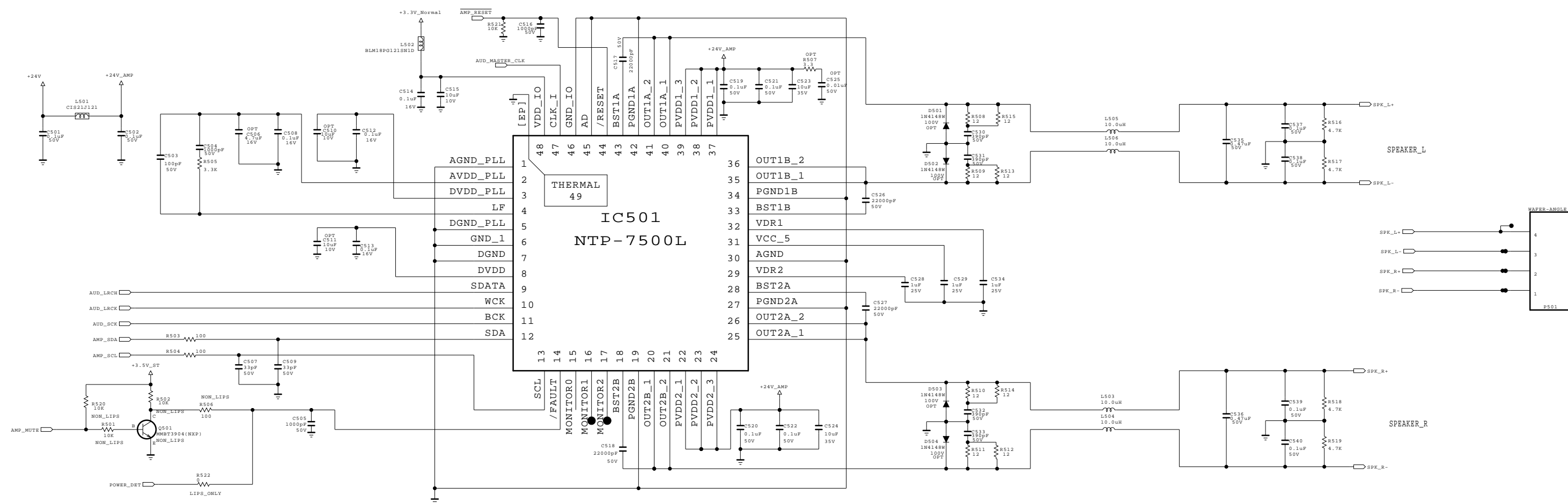
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MODEL	GP4L_S7LR2	DATE	2011/10/04
BLOCK	HEADPHONE	SHEET	15 /

Audio amp (NTP-7500)



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MODEL	GP4L_S7LR2	DATE	2011.10.04
BLOCK	NTP-7500	SHEET	16 /

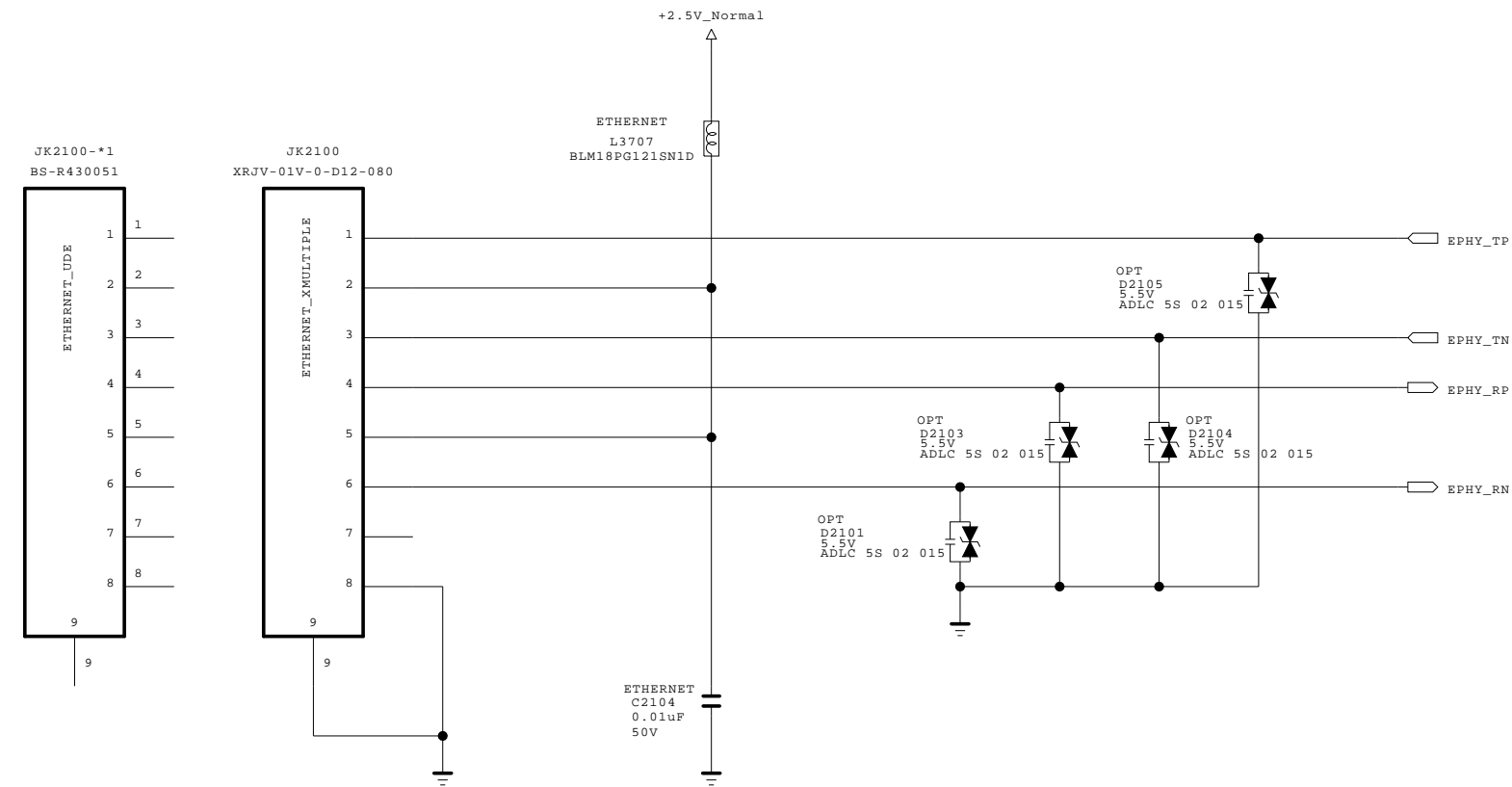
COMPONENT1
x
AV



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ETHERNET

* H/W option : ETHERNET



THE  SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE  SYMBOL MARK OF THE SCHEMETIC.

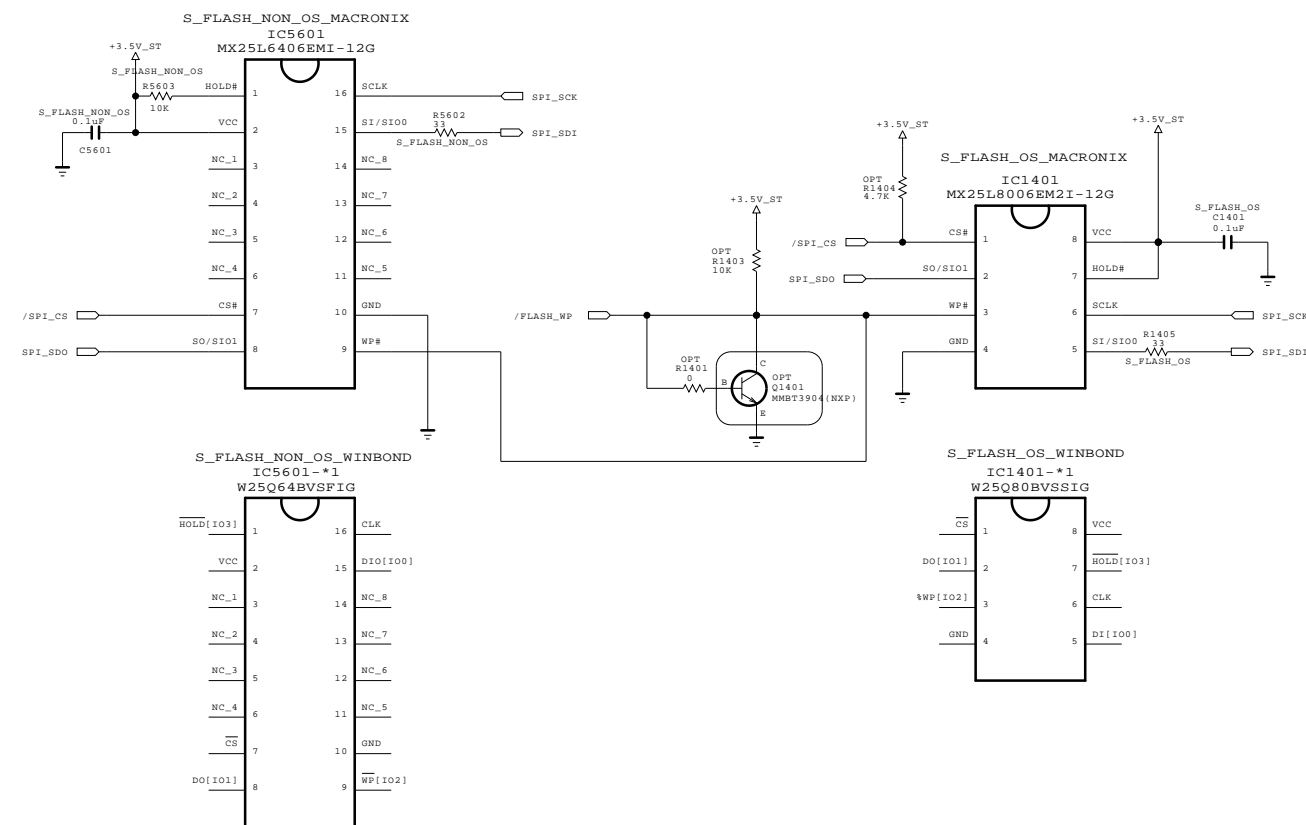
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 LG ELECTRONICS

MODEL	GP4L_S7LR2	DATE	2011/06/14
BLOCK	ETHERNET	SHEET	21 /

Serial Flash for SPI boot_NON_OS and OS



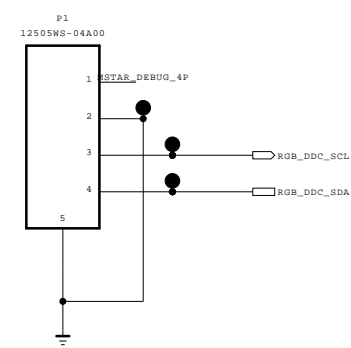
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MODEL	GP4L_S7LR	DATE	2011.08.29
FIGURE	Serial FLASH	SHEET	56 /

MSTAR_DEBUG_4PIN



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MODEL	GP4L_S7LR2	DATE	2011/09/05
BLOCK	MSTAR_DEBUG_4PIN	SHEET	58 /

